The United States MILLER

Volume 9.—No. 4. MILWAUKEE, AUGUST, 1880. Terms: $1.00 a Year in Advance. Single Copies, 10 Cents.

Boiler Explosions by Mysterious Agencies.

The Locomotive: The belief, which has for many years been prevalent, that mysterious agencies within a boiler were often the causes of the most disastrous explosions, baffling coroners' inquests, generally resulting in a verdict so mysterious that nobody could understand it, or in throwing the blame entirely on to Providence, is fast giving way before the light which is brought to bear by the investigations of practical men. One reason why this mysterious theory had become so prevalent was, it was taught in the scientific books of earlier days. Most of the old chemistries adopted the "Donny theory" as explanatory of boiler explosions, and some of the later works have either adopted the same or some new fangled notion equally impractical. The writers of theories, and the compilers of books on Chemistry and Natural Philosophy have not usually been eminent for practical knowledge in mechanics, and hence many text-books have led the student into serious errors. Laboratory experiments have been too much relied upon as an explanation of boiler explosions. The fact that the conditions under which the experiment is made are entirely different from those of a boiler in use, has been overlooked. If the experimenter and writer had really desired to understand the subject thoroughly, he would have hastened to some boiler-house, and despite the dirt and dust and heat, have made himself familiar with every part of a boiler and every attachment thereto. The methods of construction would not have been overlooked, nor quality of fuel and water. These points cannot be gained by a mere cursory examination, nor by looking through a window or a door to avoid the heat and dirt. It must come from days of contact with the dirty and unpleasant side of the subject. Such knowledge to be valuable must be practical.

It is gratifying to the steam user to know that in these days men are investigating this subject who have been trained in the practical school, Men who are familiar with all types and forms of boilers, look to the quality of the material of which they are constructed, and the quality of the workmanship.

These investigators who have examined all kinds of boilers under the varying conditions of use, and who have made the subject of boiler explosions a careful study, are explaining the causes of these terrific accidents, and showing how they can be avoided. The causes of boiler explosions are now summed up under four heads, viz: *bad material; faulty in type; bad work in construction*, and *inefficiency and carelessness in management.* Explosions may occur from any one of these causes, even if in other respects the boiler is sound. So the problem is reduced to its simplest form, and any purchaser or user of a steam boiler can nnderstand what is required. The readers of the *Locomotive* will remember that this has been the ground taken in its pages for more than twelve years. It has stood up firmly against the theory of mysterious agencies as a cause of boiler explosions, claiming that if such views were once established there would be no responsibility resting upon any one. The maker of poor iron would seek refuge under the mysterious agency theory, and so would the mechanical engineer who planned a boiler of faulty type, and the boiler-maker whose work was unfit to withstand the load imposed upon it would find abundant cause for congratulation in the "mysterious agency" theory. The engineer who must stand before his boiler day after day, year in and year out, would find very little satisfaction in contemplating, that no matter how vigilant he may be, there were agencies in his boiler that, without a moment's warning, may blow him out of existence. The only way to prevent these accidents or diminish their frequency, is to put the responsibility where it belongs. First, upon the manufacturer of the iron; then upon the boiler designer and maker, and lastly upon the boiler owner and user, and the engineer whom he employs. There is no place for cheap, ignorant, and careless help here. Nor is there any excuse for the penurious manufacturer who disregards the advice of his engineer in regard to repairs, until from sheer weakness and inability to hold out longer, the boiler "lets go" and brings consequent destruction and woe. Any intelligent person who will give this subject careful thought will find little reason or comfort in the "mysterious agency" theory. We have made enemies by combatting it. We have even been sued in the courts for ridiculing it, *but without harm.* With its fall, will fall the business of its advocates, some of whom have preyed quite long enough upon the cupidity of such steam users as they could influence.

Planetary Evolution.

We believe that Professor Loomis, of Yale Collage, New Haven, was the first to propound the hypothesis in regard to the comparative age of planets and the time required for their developement, that all the planets were not nhabited nor habitable at the same time, but that when, in the course of ages, those planets furthest from the sun had become, by gradual cooling, so far reduced in temperature as to be fit for organic life, such life would be developed on their surfaces; and when at last, by further cooling, all their waters had solidified, they became unfit for the abode of living beings. In the meantime those nearer to the sun than our earth reached this period later, and progressed in organic development; but in their turn they will come to the end of their destiny. He supposed that the planets nearer to the sun than our earth (Venus and Mercury) have not as yet reached the end of the usefulness, which will arrive when, in future ages, the sun itself has further cooled down to such a degree as to communicate no more heat to them than is now given to the earth. Consequently, as Prof. Loomis held, the planets further from the sun than Mars, Jupiter, Saturn, etc., have had their time of organic developement at a period when the heat of the sun was so much more intense than it now is as to give them as much heat as now is received by our earth; while for the planets nearer to the sun than our earth is, a similar period is reserved for future ages.

It is evident that this hypothesis is founded on, and is complementary to, the theory of Kant and Laplace, which is that the planetary systems are involved by condensation and cooling of nebular matter into evolving masses of different sizes, situated at various distances. The hypothesis of Prof. Loomis, notwithstanding it is not correct, contains the germ of fundamental truth, which in the course of time will be more and more recognized, namely, that the evolution theory applies especially to the formation of worlds, that they were not created simultaneously in the condition in which we find our earth at present, but that every earth has its independent period of incubation, development, growth, infancy, further increase, and fullness of activity, with the climax of evolution, followed by old age, decay, and death; that the latter stage has been reached by the exterior planets, that the interior planets are as yet in their infancy, and that our earth, and perhaps Mars, are now in their full maturity. Indeed why should we suppose that, notwithstanding that time is by necessity as infinite as space, the Creator should not have availed himself of the infinity of time as we are sure he has availed himself of the infinity of space, filling it with countless myriads of worlds, nay, of planetary systems, constellations, and galaxies? The Germans have a beautiful proverb which expresses this truth in a very condensed form. They say: "God works slowly because he is eternal."

But, to return to Prof. Loomis' hypothesis. Notwithstanding that it is true in principle that the different planets are not of the same age and in the same condition, one important element has been overlooked, which, when taken into consideration, will modify it and lead to different conclusions. This element is the relative size of the planetary bodies and its consequence in regard to the period necessary for their cooling down. Bischoff, in Germany, has shed much light on this subject by his cooling of artificial rocks of various sizes, by which he tried to deduce a law by which the periods of cooling of such enormous masses as constitnte the planets could be estimated.

His experiments were made in one of the German iron founderies, where the slag was as near as possible equivalent to basalt; he had this slag cast into large rough globular masses of different sizes, all provided with a narrow radial channel by which the temparature of the interior could be observed at different depths, and the observation made during their slow process of cooling taught many useful lessons. First, it was found that all projecting asperities corresponding with high mountains on the earth's surface were soon cooled down below the temperature of the more level and uniform portions, where a higher temperature was longer maintained, being nearer to the interior source of heat. This faet is a very instructive hint as to the cause of the low temperature of high isolated mountain tops, notwithstanding that in plateaus and table lands situated at the same height or distance from the center of the earth the temperature has been found not to be so low.

Secondly, it was found that from the surface inward the temperature increased rapidly, and that while a solid crust was formed, the whole interior was still a liquid mass.

Thirdly, it was found that after cooling and solidification was so far progressed as to make correct observations respecting the central heat possible, this heat was, in the case of large masses, maintained for weeks and months, and in attempting to find the law of the relation of size of mass and time of cooling, and applying this to masses of the size of the moon, the earth, Jupiter, and the sun respectively, it was found that the time required for cooling was enormously long, and that while a mass of the size of the moon would cool in say one million years, it would take the earth a hundred million years, Jupiter ten thousand million, and a mass like the sun many millions of millions of years to become cooled down, always supposing that they primitively had the same temperature.

The latest astronomical observations made with the modern superior telescopes and the revelations of the spectroscope, if combined with the same, have shown a number of facts in perfect accord with the above. Thus the spectroscope proves that the sun is at so high a temperature that all substances, without exception, are in the state of vapor—a temperature indeed of which it is very difficult for us to form a conception; that its low specific gravity accords with that of gases liquified by powerful compression, the result of the very high force of gravitation necessarily prevalent on this gigantic mass, and which cannot possibly be accounted for in any other way.

We find that modern astronomers have come to the conviction that the body next in size to the sun—Jupiter—has his own heat, and even light, and is surrounded with red-hot vapors. We know that our earth has its own heat still in the interior, and that only the surface is cooled down; and, finally we know that the moon has cooled down so far that what there may still exist of interior heat does not now reach tne surface, at least not to such an extent as to make organic life a possibility there; in fact, observations prove more and more that the nature of the moon's surface is very similar to that of our high mountain peaks above the snow line. The peak of Teneriffe has been especially mentioned by explorers as being a type of many forms found on the moon's surface.

This view is one of the arguments in favor of the now often attacked theory of ascribing all volcanic action on our earth to a hot liquid or simi-liquid interior, and not to local actions of a chemical or mechanical nature, such as oxidation or sulphuration of metals, or to pressure and friction by dislocations and formation of faults. The fact of the frequency of volcanic action among the two hundred active volcanoes in existence on our earth's surface, appears of itself a sufficient argument against local causes, and in favor of a general origin, which may be found in the central heat; this, when reached by water penetrating here and there through the earth's crust, it will be changed into high-pressure steam, and the power of this agent, even in the hands of feeble man, is enough known to conceive what it may accomplish when subject to the infinitely more powerful agencies of nature in its gigantic subterranean workshops.

Texas Millet.

The Texas millet is a forage plant which has gained some prominence in the Southern States, and is put forth as worthy of attention by the Commissioner of Agriculture in his report for 1878. It is represented to be a grass of vigorous, rapid growth. It is very leafy, the leaves broad, rather thin, sprinkled with soft hairs. It grows two to three feet high, but the spreading stalks are often four feet or more in length, growing very close and thick at the base, and yielding a large amount of food.

This grass has been brought to the attention of the Department during several years past. Mr. Pryor Lea, of Goliad, Texas, has had it in cultivation for a number of years, and writes respecting it as follows: "I consider it far superior to any grass that I ever saw for hay. It is a much more certain crop than millet, and cultivated with less labor, and all kinds of stock prefer it. I expect to report a good second crop on the same ground this year. In this region this grass, in the condition of well-cultured hay, is regarded as more nutritious than any other grass. It grows only in cultivated land; it prospers best in the warmest fourth of the year; its luxurious growth subdues other grasses and some weeds, with the result of leaving the ground in an ameliorated condition."

The following is the technical description of the plant: Branches of the panicle rough, the pedicels with scattered hairs, especially near the flowers; spikelets oblong, somewhat pointed, 2 to 2½ lines long, sparsely hairy; lower glume half or two-thirds the length of the upper, acute 5- nerved, the lateral nerves uniting with the midnerve below the apex; upper glume prominently 5 to 7, nerved, pointed; sterile flower with 2 palets, the lower 5 to 7 nerved, much like the upper glume, the upper palet thin and transparent, as long as the lower; perfect flower ovate or oblong-ovate, acutish, transversely wrinkled with fine reticulated striæ.

An annual grass two to four feet high, sparingly branched, at first erect, becoming decumbent and widely spreading, very leafy sheaths and leaves finely soft—hairy; margin of the leaves rough; leaf blades 6 to 8 inches long and ½ to 1 inch wide, upper leaves reaching to the base of the panicle, or nearly so; panicle 6 to 8 inches long, strict, the branches alternate, erect, simple, 3 to 4 inches long, with somewhat scattered sessile spikelets.

THE gross receipts from Internal Revenue for the fiscal year just ended will be in the neighborhood of $123,000,000, an increase of $10,000,000 over the receipts for the previous fiscal year, and $3,000,00 over the estimates of the department.

UNITED STATES MILLER.

PUBLISHED MONTHLY.

OFFICE, 62 GRAND OPERA HOUSE, MILWAUKEE, WIS.

Subscription Price..... $1 per year in advance
Foreign Subscription..... $1.50 per year in advance

ANNOUNCEMENT.

MR. P. SCHNEITLER, *Berlin, N. Mueller St., 179 B, is duly authorized to receive subscriptions and advertisements for the* UNITED STATES MILLER, *from all parts of Continental Europe, and to receive payment for the same.*

WM. DUNHAM, *Editor of "The Miller," 69 Mark Lane, and* HENRY F. GILLIG & CO., *449 Strand, London, England, are authorized to receive subscriptions for the* UNITED STATES MILLER.

MILWAUKEE, AUGUST, 1880.

MILLERS' ASSOCIATION DIRECTORY.

NATIONAL ASSOCIATION.

President—George Bain,..... .....St. Louis, Mo.
Secretary and Treas.—S. H. Seamans, Milwaukee, Wis.
VICE PRESIDENTS—L. Fletcher, Minneapolis, Minn.; Robert Tyson, Baltimore, Md.
ACTING EXECUTIVE COMMITTEE—Geo. H. Christian, Minneapolis, Minn.; S. H. Seamans, Milwaukee, Wis.; Alex. H. Smith, St. Louis, Mo.; Philip Haxall, Richmond, Va.; J. A. Hines, Rochester, N. Y.

STATE ASSOCIATIONS.

MINNESOTA—President, W. P. Brown, Red Wing; Secretary, Frank S. Hinkle, Minneapolis; Treasurer, W. F. Cahill, Minneapolis.

IOWA—President, J. J. Snouffer, Cedar Rapids; Vice-President, H. Hammond; Secretary and Treasurer, J. R. Serrin; Executive Committee, J. R. Serrin, H. Hammond, G. F. Weist, F. J. Woodbury.

NEBRASKA—President, Elam Clark, Omaha; Secretary, C. D. Smith, Lincoln; Treasurer, E. J. Curson, Lincoln.

KANSAS—President, Robert Atkinson, Ottawa; Secretary and Treasurer, Frank H. Pope, Ottawa.

MISSOURI—President, E. Goddard, St. Louis; First Vice-President, John Orangle, St. Louis; Second Vice-President, J. O. Roberts, Clarksville; Secretary, D. B. Kirk, St. Louis; Treasurer, Geo. J. Plant, St. Louis.

KENTUCKY—President, Wm. N. Potts, Richmond; Vice-Presidents, Jno. E. Miles, Frankfort; Wm. Shaw, Paris; C. J. Grover, Mt. Sterling; L. H. Nottnagel, Lexington; Secretary, E. D. Hix, Payne's Depot; Treasurer, A. Weisenberger, Payne's Depot.

ILLINOIS—President, D. B. Sparks, Alton; Secretary and Treasurer, C. H. Seybt, Highland.

WISCONSIN—President, E. Sanderson, Milwaukee; Secretary and Treasurer, S. H. Seamans, Milwaukee.

MICHIGAN—President, J. D. Hays, Detroit; Secretary and Treasurer, W. Hibbard, Grand Rapids.

INDIANA—President, Nicholas Ellis, Evansville; Secretary, H. H. Emery, Indianapolis; Treasurer, D. A. Richardson, Indianapolis.

OHIO—President, F. Schumacher, Akron; Secretary and Treasurer, Robert Colton, Bellefontaine.

MARYLAND—President, Robert Tyson, Baltimore; Secretaries, J. Olney Norris and W. B. McAtee, Baltimore; Treasurer, W. H. Woodyear, Baltimore.

NEW YORK—President, Geo. Motley, Rochester; Secretary and Treasurer, J. A. Hines, Rochester.

TEXAS—President, John Kerr; Secretary, M. Gray, Dallas; Treasurer, P. S. Sheppard, Houston.

PENNSYLVANIA—President, Chas. D. Miner, Wilkesbarre; Secretary and Treasurer, A. Z. Schock, Selinsgrove.

THE MILWAUKEE PRACTICAL MILLERS' ASSOCIATION—President, Chas. Mueller; Vice-President, Levi Hicks; Recording Secretary, H. W. Sherwood; Financial Secretary, Louis Holtz; Treasurer, E. DeHaus; Usher, Edward Hiemke.

THE NATIONAL ASSOCIATION OF BRITISH AND IRISH MILLERS—President, Mr. Alderman Hadley, City Flour Mills, London, England; Secretary, J. H. Chatterton, 69 Mark Lane, London, E. C., England.

We send out monthly a large number of sample copies of THE UNITED STATES MILLER to millers who are not subscribers. We wish them to consider the receipt of a sample copy as a cordial invitation to them to become regular subscribers. We are working our best for the milling interest of this country, and we think it no more than fair that our milling friends should help the cause along by liberal subscriptions. Send us One Dollar in money or stamps, and we will send THE MILLER to you for one year.

If you are not already a subscriber to the UNITED STATES MILLER, *send one dollar at once and begin with our May number, which commences the fifth volume.*

SUBSCRIBE for the U. S. MILLER. Only $1 per year.

Grain Producing Countries of Europe Compared with America.

The *Inter Ocean* of the 17th inst. contained a very interesting article from the pen of Mr. Robert P. Porter, one of its staff, on the subject of "The Grain Producing Countries of Europe Compared with those of America," The writer seems to have taken special pains to gather statistics of the growth of the crops in the different countries in Europe, and presents the following as the population of the countries and the total cereal production of each, with that of the United States:

Countries.	Population.	Total cereal Production.
United States	50,000,000	2,434,873,060
Russia—European	68,097,025	1,483,437,500
Germany	38,450,646	727,703,774
France	37,847,478	710,069,279
Austria	32 573,002	488,092,000
Great Britain and Ireland	29,866,735	355,053,389
Sweden and Norway	5,815,619	62,000,000
Denmark, without Duchies	1,701,200	23,500,000
Holland	3,529,108	36,725,900
Belgium	4,940,570	64,297,692
Switzerland	2,510,494	17,200,000
Portugal—Continental	3,987,861	24,503,367
Spain, with Balearic Isles	16,046,217	120,000,000
Italy	24,241,860	187,246,957
Greece, with Ionian Isles	1,325,340	9,300,000
Roumania	3,864,848	136,439,963
Servia	1,978,281	14,000 000
European Turkey	10,500,000	110,000,0 0
Totals	336,375,284	7,017,042,821

The following is a tabular statement showing the amount of wheat, corn and oats raised in the United States and seventeen foreign countries:

Country.	Wheat.	Corn.	Oats.
United States	448,755,000	1,544,890,000	364,253,000
Russia	458,437,400	29,000,000	4 0,000,000
Germany	88,679,274	.....	200,475,000
France	286,928,650	21,186,348	206,432,302
Austria	70,260,000	58,540,000	149,575.000
Great Britain	110,665,217	.....	160,313,720
Sweden	2,000,000	.....	23,000.000
Denmark	3,000,000	.....	3,200,000
Holland	4,801,500	.....	12,564,100
Belgium	16,138,936	.....	20,389,156
Switzerland	2,100,000	.....	5,200,000
Portugal	5,944,825	16,201,669	517,467
Spain	60,000,000	28,000,000	3,000,000
Italy	94,592,212	42,849,237	9,000,000
Greece	3,200,000	2,800,000	200,000
Roumania	42,620,330	55,205,091	4,039,810
Servia	4,000,000	5,900,000	500,000
European Turkey	40,000,000	30,000,000	3,000,000
Totals	1,742,063,444	1,833,662,340	1,615,660,185

Mr. Porter states that the average per capita production of cereals in Europe is 16 bushels. In 1850 it was 36.3 in the United States; in 1870 it had increased to 48:3, yet during that period of time the population of the country had increased at a ration far greater than that of any European country.

It is evident, from a study of the above tables, that the two great grain producing countries of the world are Russia and the United States. There are some countries which produce enough to supply their wants, but those countries, where the population is largely engaged in manufacturing, and where the people are massed in large cities, must draw their supply of food from the fertile and broad acres of these two immense empires.

Russian grain exports during the last twenty years would seem to indicate an advance almost without parallel. But such, says a writer in the *National Quarterly*, is by no means the case. He admits that her exportation of corn almost trippled itself during the fifteen years which elapsed between 1857 and 1872, the former year showing a total of 51,588,981, the latter of 134,600,000 rubles (a ruble is worth about 75 cents); but what these figures really imply is not that the present total is not conspiciously above the average, but the past one was conspiciously below it. In 1857 Russia was literally exhausted by the drain of the Crimean war. Of the 419 miles of railway, which were all that she then possessed, not one foot lay either in or near the corn lands of the South, while of her 49,000,000 peasants, 23,000,000 were serfs, working not for their own benefit, but for that of their masters. In 1872 the 419 miles had grown into 8,123, including several important Southern lines; redistributed land was being tilled by her labor, and a foreign influx of capital had given an impetus to commercial activity. Since that time, and especially during the last three years, the Russian grain trade has declined considerably. The war in 1877-78, by suspending traffic on the Southern and Western railroads to facilitate the transport of troops and military stores, produced a diminution augmented by the present Nihilist disturbances. Taking one year with another, the average value of Russia's grain exports may safely be rated as high as 100,000,000 rubles ($75,000,000) annually. It has been aptly observed that among Russia's countless anomalies, not the least striking is her simultaneous display of the best crops and the worst farming in the world.

Before the great systems of railroads now partially constructed were even planned on paper, Russia pushed the United States completely out of the English wheat market. From 1860 to 1865 inclusive, Russia supplied England with 47,876,807 bushels of wheat, and during the same period the United States furnished 137,047,126 bushels. From 1868 to 1872, inclusive, Russia supplied 417,007,022 bushels, and the United States only 116,402,380 bushels, an increase during the latter period as compared with the former of 70,500,213 bushels from Russia, and a decrease of 10,584,476 from the United States. The cause of this failure on our part in the contest was our costly transportation from the interior to the seaboard. Russia had, between the two periods named, improved and cheapened her access to the sea, while during the same time in the United States, it will be remembered, corn was used in the West for fuel, and high rates very generally prevailed. In 1868 to 1872, inclusive, the average cost of transporting a bushel of wheat by water, from Chicago to New York, was 23 cents, while for the four years, 1873 to 1876, inclusive, the average was only 13 cents, and in 1878 somewhat under 10 cents per bushel. As a result, our exportations to British markets suddenly increased from 23,291,476 bushels to 50,908,508 bushels per annum (or 118 per cent), while Russia's exportations decreased during the same period from 23,553,404 bushels to 15,905,660 bushels per annum, or 32 per cent.

These facts and figures show beyond all question how the matter of a few cents a bushel in the prices of carrying grain from one point to another sometimes changes the course of an immense trade.

Mr. Porter takes this cheerful view of the outlook: To weigh the resources of two countries like Russia and America, and attempt to compare the one with the other, is a Herculean task, and, with the limited data at hand, virtually impossible, but our very ignorance of the strength of our adversary may result in misfortune to us. Once let Russia recover her strength, and who shall say that it is impossible for us to find ourselves in the same predicament as we were in 1868 to 1872? But, after all, there is much in these figures of a cheerful character.

They have brought before us the most colossal railroad system of the world. They exhibit to us an enterprise that is unequaled, and, taken as a grand whole, they show beyond any question, that while monopolies do exist, in the main, the cost of bringing the product of the vast grain fields of the West to the seaboard is steadily getting less and less. True, the want of uniform rates may be urged; true, as has already been shown, this great system has been guilty of shameful abuses of power; true the shipper has had a right in many instances to complain. But for all this, if we look at the grand central movement which is making the United States the grainery and storehouse of the world, the movement which has brought to our shores an army of ten millions of immigrants within half a century; the movement that has forced the center of population four hundred miles into the interior of the country—in short, the movement that has changed the face of a continent, and is still rushing rapidly onward and bringing us every year closer to those countries across the seas, whose densely populated cities and poverty-stricken agricultural districts are looking to the virgin acres and thriving cities of this continent for homes for their surplus population. If we take this broad view of the subject useful lessons may be learned from the past, and hopeful signs of more uniform and steadily decreasing rates of transportation may be seen for the future.—*Chicago Journal of Commerce.*

An Open Letter.

FROM GEO. E. GAULT, ESQ., PRESIDENT OF THE FIRST MILLERS' INTERNATIONAL EXHIBITION.

[Published by special request.]

CINCINNATI, July 27, 1880.

C. A. Wenborne, Esq., Buffalo, N. Y.—DEAR SIR: My attention has been called to several articles in the last number of your alleged milling paper, *The Milling World*, concerning our firm and its relations to the late Millers' International Exhibition. I am puzzled to know whether these articles were instigated by malice or stupidity.

In the matter of grain-cleaning machinery, I wish to say that you were on the ground, and I will do you the credit to suppose that you were enough of a journalist to be aware of the fact that a protest was filed by every manufacturer of grain-cleaning machinery at the Exhibition against the award of the premiums to Barnard & Leas. You also should be aware of the fact that the jurors were appointed by the Millers' National Association, and that the Hon. Geo. Bain, President of the Association, came to Cincinnati during the latter part of the Exhibition especially to hear and decide in all cases where protests had been filed.

The protests against the awards to Barnard & Leas were in his opinion so reasonable (premiums having been given to machines which were not only not running, but which had never had belts attached to them) that he thought it would be proper to appoint new jurors and award new premiums on machines only that were in actual motion. All of these facts certainly should have been known to you, if you profess to be a journalist when you wrote the articles to which I refer.

In the matter of automatic grain scales, you say that there was a unanimous protest filed by the exhibitors in this class. If such protest was filed, it must have been with yourself, as none certainly was filed with the Millers' National Association, or its authorized representative at the Exhibition, or with the Board of Commissioners of the Exhibition.

I respectfully submit that you were not the proper person to receive protests. The jurors in this class were Jonathan Mills, David Howes and George W. Tucker,—men of national reputation, whose judgment you certainly attack and impugn in your article as well as ourselves, as *the scales were all in actual operation.*

In the matter of the award for the best barrel of flour, I will say that as you are not a miller, and evidently *not posted* in milling machinery, you perhaps cannot be blamed for the remarks you make. For your information I will say that as much depends upon the miller in producing good flour as upon the mill. The company who obtained the premium had the services of the best miller in Messrs. Bennett & Knickerbocker's mill, and also the services of Mr. Harmon, the Superintendent of the Geo. T. Smith Middlings Purifier Co. In addition to this they had stones from Bennett & Knickerbocker's mill which were in the very finest grinding condition. They had one pair of stones for grinding wheat and three pair for finishing up, in addition to one roller mill. This is certainly not good milling. Again, the rules did not require the jurors to be guided by the number of bushels of wheat which went into the barrel of flour. They simply were asked to select the best barrel of flour. *Our* barrel of flour was made with a view to economy.

I do not wish to believe that you printed what you knew to be deliberate falsehoods, and yet I cannot account for the fact of your being on the ground the whole time, or nearly the whole time, of the Exhibition, and yet be so utterly ignorant of facts which were known to every newspaper man present.

You ignore the fact that in every class, notably that of flour, protests were filed. You also fail to notice that a unanimous protest was filed against Nordyke & Marmon Co. using the old burrs from Bennett & Knickerbocker's mill. In everything you single out our firm for your mud-slinging. Why this should be the case I am unable to understand. It has been suggested to me that it was because our firm did not advertise with you, but this idea I of course dismiss at once, feeling confident that you had some deeper motive for your personal attacks upon our firm. I had promised myself I would answer nothing that might appear in print concerning myself or the Exhibition, but your statements attacking our firm are so manifestly unfair and unjust that I cannot allow them to pass unchallenged.

As to the Exhibition itself, of course many things could have been improved, but I gave it my entire time and attention for six months to the neglect and detriment of my own business, and did the very best I could, and have nothing to reproach myself with. No doubt *you* could have managed it better. The intelligent and impartial spirit with which you have treated our firm in your paper since the Exhibition closed, leads me to believe that you would make yourself intensely popular as President of the second Millers' Exhibition, so popular, indeed, that the exhibitors would most likely donate you a suit of tar and feathers before the Exhibition was half over. But I hardly think there will ever be another Millers' Exhibition. It is doubtful whether any city would care to pay $20,000—which now appears to be the amount of the deficit—for the honor of having an exhibition of this kind; but should there ever be, I desire now in advance to offer my sincere sympathy to the unfortunate who may be its President, as, if the Exhibition is run on as broad and liberal scale as ours, he will have a great deal of hard work, and his reward will be to be assailed by all the petty creatures who can tear down, but not build up, and find flaws but never perfection.

GEO. E. GAULT.

ROPER'S ENGINEERS' HANDY BOOK.—The above is the name of a new work of great value to steam users anywhere. Mr. Stephen Roper, the well-known engineer, is the author, and Messrs. Claxton, Remsen & Haffelfinger, of Philadelphia, the publishers. The book is in large pocket-book shape, handsomely printed and substantially bound, and can be had from the publishers for $3.

The Millers and the Patent Laws.

We doubt whether there has ever been so large and complete an exhibition of the mechanical appliances of any trade, in practical operation, as that which was presented by the Millers' International Exhibition just closed at Cincinnati. The milling business has made great progress within a few years past—so great that a revolution may almost be said to have been affected therein—and old methods of making flour are everywhere being superceded by a radically different system, whereby the quality of the product is greatly improved. No where else has the contrast between the old and the new methods and their products been shown in such marked contrast, with such an extensive display of every kind of machinery, as the Cincinnati Exhibition, and yet there is hardly a machine or an article for collateral use in the trade, which has materially contributed to its recent progress, that is not patented. It is our patent law, the protection it gives to inventors, the encouragement it offers to those who devote their time and means to improving old processes, that has chiefly made this exhibition what it is.

And yet, strange as it may seem, with this practical proof before them of what the patent law has done for their business, the millers, in convention assembled, proceeded to make one of the most foolish and unreasonable attacks upon our patent system we ever remember to have seen formulated. The Millers' National Association of the United States have a standing Committee on Patents, and at their recent meeting in Cincinnati this Committee made a report, which was adopted by the Convention, avowdly to aid in "reforming" our patent laws and practice, and to "measurably free users of patented devices or processes from expensive litigation," etc. The "reforms" proposed include nearly every variety of objection to our patent laws which habitual infringers are in the habit of urging, and are as follows:

1. "More liberal appropriations by Congress to the Patent Department, enabling closer scrutiny of the application for those patents, and consequent avoidance of the too frequent granting of patents on claims in which the essential features of novelty and usefulness are wanting." Is not the Committee aware that the total expenses of the Patent office is paid by the inventors themselves, and that the examinations always involve a search through all like claims ever filed in the department? And if a patent is issued for anything that is not "useful," are not the millers aware that it is invalid and good for nothing, and is it any great hardship to ask the millers to let a thing alone if it is not useful?

2. "The abolition of the practice of reissue under new date or title, and sometimes for things scarcely hinted at in the original." If a miller obtains a defective title to real estate, through carelessness or error of his own, the courts will help him to correct such title when it can be done without prejudice to the rights of others. Why should not a patentee, proceeding in good faith, have the like privilege? Further than this, a reissue is not valid if it covers "new things" involving different principles from what were set forth in the original patent.

3. "The establishment and maintenance of a special patent court at Washington to determine the validity of patents, before which court all parties directly or remotely interested in any case pending shall have ample time and opportunity to be legally and publicly heard." This is really a strange point to make in behalf of those who are now so vigorously protesting against the expense of patent litigation. It is proposed to have a new court, which cannot supercede, but must be auxiliary to the law machinery we now have, and to impose upon litigants in all parts of the country the necessity of a preliminary hearing of their case at Washington, instead of having the trials take place as at present in the several districts where they reside.

4. "The annual assessment of such a tax upon existing patents as can only be paid by owners of useful patents, and which in default of payment of renewal tax, will free the records of worthless patents." It might just as rightfully be proposed that all flour mills making a low grade of flour should be taxed out of existence. The impositions of a tax on patents on such grounds would be nothing more nor less than direct robbery.

5. "A reasonable limit during which an inventor or patentee must successfully introduce his improvement to practical use and notice, in order to claim against any who may thereafter use the same." The present law makes seventeen years such reasonable limit, during which the inventor must not only introduce his improvement, but make therefrom all the profits which are to pay him for the time and means he has devoted to its development. This is the consideration which spurs him to the effort, and the public, at the end of seventeen years, be possessed of the free right to use his invention or discovery, whether or not they pay its use before that time.

6. "Some more reasonable measure of damages, with reference to actual benefits, in cases of established infringement." The courts always insist upon an accounting to show what gains or profits an infringer has made by his use, without permission, of the property of another. In this accounting the infringer has a perfect right to show what other means were open to him whereby he might have avoided the use of the patent, and in this way it has always been shown that the patent he infringed upon was of no value at all to him. In many such accountings the damages for infringement have been placed at only six cents, and in all cases they are assessed by the court only after a full hearing of what both sides have to say. If a "reasonable measure" of damages cannot be arrived at on such investigation, we fail to see how in this fallible world such object is ever to be attained—that it should *never* be reached would probably be nearer what the Committee would recommend.

7. "Greater restrictions in the granting of injunctions, before the validity of a patent has been tried and established, and also preventing the fixing of excessive bonds in cases where temporary injunctions are granted." The general practice now is not to grant injunctions until the validity of the patent has been established, unless it is evident that the alleged infringer is deliberately endeavoring to avoid the consequence of his infringement and escape the jurisdiction of the court. The amount of the bonds which must be given are in each case regulated by the probable measure of damages, and are so fixed by the courts only after an examination in which the infringer has an equal right with the patentee to be heard.

8. "An amendment to the effect that, when new suits are begun under the same patent, in which a decision has already been made in a lower court, and appeal to a higher court, the defendant may demand a stay of proceedings pending decision in a higher court, and that he may become a party in the pending suit, avoiding the unnecessary expense of special defense, requiring the taking of testimony, and construction and explanation of models already on record." This is according to the general practice of our courts at the present time, except that the defendant has no *right* to this stay, and to be made a co-defendant in another suit, unless in accordance with the judgment of the court. When a stay of proceedings is granted in such case it would be a grave injustice to the patentee to allow his rights to go by default during the pendency of a long litigation, but by the giving of proper bonds by the defendant the court will generall grant the stay.

Finally, to "give force these recommendations," as the Committee say, it is urged that the Association should make itself "financially strong," to prevent the granting of what they are pleased to style "fraudulent patents or reissues," for which they would have paid lawyers constantly "on the alert" in Washiugton, all the millers in the country contributing to funds for such a purpose. Is not this a direct proposal to attempt to circumvent laws passed in pursuance of an important provision of the Constitution? And are not the beneficient effects of those laws written in every leading feature of the great Exhibition now just closing? If the millers, or representatives of any other industry, combine to obstruct the equitable administration of our patent laws, is it not just possible that inventors and patentees may, by like combinations, even more energetically defend their legal rights?

It is a matter of astonishment to us that the millers of this country, supposing they are truly represented by the Committee, have seen fit to take this view of our patent law. We should rather have thought that a system which has done so much for them would have met with nothing but kindly words, and that inventors would have received that encouragement from them which alone will induce them to put forth vigorous efforts to perfect that system of milling improvements which has already made such progress, but which is yet far from having attained perfection.—*Scientific American.*

It is now expected that the new mill at Mankato, just changed to the Hungarian system, will start up about the 15th of August.

Foundations.

The character of foundations is as important a subject as can be studied in connection with mill building, and we fear that too little attention has been paid to it. The foundation should be thoroughly tested with an iron rod or pump auger, to ascertain if the soil is firm. In starting the masonry the large stones should, of course, be placed at the bottom of the pit, so as to equalize the pressure as much as possible, and they should be carefully bedded, so that they cannot possibly rock. Where a mill is built in front of a race, with a yielding bottom, which would be liable to wash away in freshets, the entire bottom should be covered with a deposit of rough, angular quarry stone, the largest being at the outside. In locating a mill, the general outlines for the plan of the village, which is often erected for the accommodation of the manufacturing population, should be fixed upon. The requirements of the little colony, which is frequently formed around the waterfall which turns the mill wheel, should be considered, in order that there may be an agreeable arrangement of the dwellings.

The whole extent of the waterfall should be in the first instance located and improved as far as practicable, as water power is always valuable; and permanent bounds should be erected at the height of the ordinary level of the water in the mill pond to serve as landmarks of possession, should mills be afterwards erected in the same vicinity. Before fixing upon the immediate spot for sinking the wheel pit the earth around it should be carefully sounded by a pointed iron rod, as before mentioned, to ascertain if there be ledges of rocks which might obstruct the necessary excavations, as by changing the location only a few feet obstruction of this sort may commonly be avoided. Although it is desirable to place the foundation of a mill upon this solid basis, yet a little attention to this may save the subsequent expenditure of large sums, which are very frequently lost by the costly excavations in flinty rocks. In laying out the ground plot for stone or brick mills, the trenches should be staked out considerably larger than the intended size of the building, to allow of the projection of one or two feet feet from the foundation stones, which, on loose soils, should extend considerably beyond the outer face of the main walls. If the lower courses of stone work, intended for the foundations beneath the surface of the ground, be three feet wider than the wall above it, then two feet of the projection should extend beyond the outer fronts of the walls and only one foot within them. Walls of buildings have always a tendency to spring off or outwards, but are effectually prevented from falling inward by the floors. Even after the utmost caution has been bestowed in laying the foundations of a mill with large heavy stones, the wall should be secured to the ends of the beams by iron clamps or screw bolts and plates, to prevent them from springing outward. Walls sufficiently strong for warehouses have been found to yield at last to the constant tremer produced by the riciprocating motions of machinery and the violent sudden thrusts occasioned by the irregular action of the teeth of wheels.

The arches above the flume and race of a mill, unless constructed near the center of the building, with each wing to serve as a buttress, are always inclined to yield to the weight pressing upon them, whereby one of the buttresses forming the end wall is commonly crowded off. The tremor of the walls affects the stones of the arch, the last yielding or opening of which allows the keystone to operate in an instant like so many wedges to prevent the span from recovering its former place, whereby the walls soon become seamed with unsighty cracks. It is better to form two small arches, or to support the center by stone pillars than to form one large span.

When the soil is composed of loose sand or clayey loam, the walls of the wheel pit should be founded upon piles, and in most cases it is common to extend the planked floor of the wheel pit sufficiently for the surrounding walls to be based upon it. Indeed, it may be adopted as a general rule that it is true economy to construct all parts of the foundations of mills in the strongest and most solid manner.

The posts which support the beams in the centre of a mill should also rest upon a very solid mass of masonry, as the lines of shafts and other mill gearing are either attached or dependent upon them for maintaining their proper situations. The settling of a pillar in the basement of a mill merely one-half of an inch will derange all the lines of horizontal shafts in every story above, whereby vast stress is thrown upon the couplings, and all the revolving wheels connected with such shafts immediately begin to wear irregularly, and to produce a clattering noise. If a block of hewn stone be used in any part of the structure, it should not be omitted here. Cast-iron pillars or posts are generally used in England, and, as they are cast hollow, like water pipes, they are not very expensive.

Great care is bestowed in laying the most solid foundations of hewn stone, to sustain the working parts of the steam engines and water wheels, in the best foreign mills. Blocks of split granite plumber blocks and other heavy fixtures for water wheels may be formed of granite at an expense which will not prove eventually much greater than if formed of timber, a material which in such institutions is very liable to rapid decay. In setting up water wheels and steam engines, particular care should be given to the construction of the framing—which sustains the first impulse, or immediate action of the moving force—as independent of the walls and floors of the mill as possible, in order to avoid impartment to the whole building the tremor which is frequently so great as to be communicated in a very perceptible manner to the ground upon which the building rests.—*Millers' Journal, N. Y.*

American vs. English Milling.

There is no disputing the fact that the direct sales by American millers, through their agents in England, of the products of their mills has stirred up our English milling friends to an extent that they are hardly willing to admit. Slow going, conservative, and as we are apt to term them, old fogyish, they have at last come to the conclusion, or at least some of the more progressive of them have done so, that in order to hold their own markets against the wide awake, energetic "Yankee" they have got to follow in his footsteps and discard the ways and methods which their ancestors have followed almost from time immemorial. To this awakening we undoubtedly owe the visit which a large party of British millers is at present paying to this country. Among that number are several keen observers and wide awake business men, who will be prompt to avail themselves on their return home of any information they may gain while here. Were the majority of their fellow millers like them we should be inclined to think that American millers would have hard work in building and keeping up an export trade for their goods. As it is, however, the disinclination on the part of many of the British mill owners to adopt new methods overcomes what little thought of progression the competition with American millers has given them, and they will put off any change as long as possible. Indeed we think it doubtful if ever in an old settled country like England, there will ever be found the same restless activity, the same exhaustless energy and the same untiring search after new and better ways that characterize the people of the newer developed portions of the United States. The same quiet, steady going, satisfied way of doing as their fathers and grandfathers did, is one of the main reasons why the millers of the winter wheat States have so far been behind their competitors in the States further north and west.

Two things give the millers of the Northwest an advantage over their English rivals. In the first place they are, either by inheritance or climatic influence, more wide awake, active and enterprising and in the second place they have the advantage in getting a splendid quality of wheat from first hands, so that they can select the best. The conditions under which they are obliged to work are thus simplified and the chances are much more in their favor. The British miller, on the contrary, is very conservative, and moreover lies under the great disadvantage of being obliged to use such wheat as he can buy when wanted. The home grown wheats are all soft, and the foreign wheats are always mixed more or less and are of many different varieties. So the conditions under which the British miller must work are greatly varied and it would be unreasonable to except any marked uniformity or grade of excellence in this product. He has however this advantage, that being on the ground he thoroughly knows the wants of his customers and can cater to their tastes better than as though he were five thousand miles away. With more push and go-ahead the British miller would stand a better chance in the competition which is now inevitable. As it is he is heavily handicapped.—*Northwestern Miller.*

Geo. M. Pierce, of Broadhead, Wis., has put in a new Fairbanks platform scale, near his mill, for convenience in weighing loads of grain.

UNITED STATES MILLER.

E. HARRISON CAWKER, EDITOR.

PUBLISHED MONTHLY.

OFFICE, 62 GRAND OPERA HOUSE, MILWAUKEE, WIS.

SUBSCRIPTION PRICE.—PER YEAR, IN ADVANCE.

To American subscribers, postage prepaid..... $1 00
To Canadian subscribers, postage prepaid..... 1 00
Foreign Subscriptions..... 1 50

All Drafts and Post-Office Money Orders must be made payable to E. Harrison Cawker.

Bills for advertising will be sent monthly unless otherwise agreed upon.

For estimates for advertising address the UNITED STATES MILLER.

Entered at the Post Office at Milwaukee, Wis., as second-class matter.

MILWAUKEE, AUGUST, 1880.

Subscribe for the U. S. MILLER; $1 per year.

A CUT loaf is better than no bread, providing it is good.

We hereby return thanks to the publishers of the *Daily Miller and Millwright* published at Cincinnati, O., for a bound copy of the Exhibition edition.

"IF B stands for Baker, what stands for the baker's wife?" says an exchange. Why, the baker, of course, if the wife has half the grit that most wives have.

HORACE GREELEY said, "Young man, go West!" If he had been speaking to a baker's apprentice, he would probably have said, young man, go (y)east.

THE Milwaukee mill furnishing establishments are all doing a good business. On many kinds of machinery the margins are close, but all seem to be well satisfied.

WHO made bread for Adam and Eve? We do not know after they were ousted from the Garden of Eden, but we have always understood before that unfortunate event that they both were well bre-d.

THE Illinois State Fair will be held at Springfield, from Sept. 27 to Oct. 2. From private letters from the Secretary we draw the conclusion that it will exceed in importance any fair ever yet held in Illinois.

We respectfully request our readers when they write to persons or firms advertising in this paper, to mention that their advertisement was seen in the UNITED STATES MILLER. *You will thereby oblige not only this paper, but the advertisers.*

THE grain dealers are just now in a flutter about the extent of the crops this year, and more pencils and paper have been used in figuring up the probable result than it would take to report another Beecher trial, and that is saying a good deal.

We will send a copy of the MILLERS' TEXT BOOK, by J. M'LEAN, of Glasgow, Scotland, and the UNITED STATES MILLER, for one year, to any address in the United States or Canada, for $1.25. Price of Text Book alone, 60 cents. Send cash or stamps.

A MILLER writes us asking if a 4-foot stone is better for use than a 2-foot stone, why would not an 8-foot stone be twice as good as a 4-foot stone? We never heard of an 8-foot stone for flour milling, but think if any one ever puts in a few runs, he will have to raise his dam and the salary of his engineer.

According to the report of the Bureau of Statistics, the total exports of breadstuffs from 16 of the principal ports of the United States for the year ending June 1, 1880, amounted in value to $277,226,762, as against $301,776,499 for the same period of time ending June 1, 1879.

WE are under obligation to Mr. Howard Lockwood, publisher of *The Millers Journal*, N. Y., for the copy of a work entitled "*The Cerealia.*" It is a valuable work of reference for the miller and farmer. The work is reprinted from articles which appeared some time since in the *Millers Jonrnal.* We do not know the priee but it is undoubtedly very moderate. We advise our milling friends to send for it.

MR. JESSE DORMAN, editor of the *Miller and Millwright*, and late Assistant Secretary of the Exhibition, was so completely exhausted by his arduous duties that he was obiged to resign his office early during the Exhibition and go on a tour among the lakes for needed rest and recreation. We trust he will soon entirely regain his usual health and spirits and return to his friends.

THE new Milwaukee roller mill, the property of Hon. J. B. A. Kern, of which mention has already been made in this paper, is rapidly rising into view, and will, when completed, be possessed of a most imposing appearance. Mr. Kern now owns the largest mill in Milwaukee or in the state of Wisconsin and when this last project of his is carried out he will be the proud owner of one of the finest mills in the world. Upon its completion we will take pleasure in giving our readers a good description of it.

A FOREIGN exchange contains a letter from an esteemed correspondent who has lived for several years past in Western Australia. He says that country presents unusual advantages for investment in milling property, and he further states that there is scarcely a mill worthy of the name in that portion of the country, while the charges for grinding are outrageous, in many places twenty cents per bushel being the charge for grinding grain, and that in a very unsatisfactory manner.

MILWAUKEE is not only blessed with a great grain trade, ample facilities for transportation by both land and water, immense elevator capacity, the finest Board of Trade building in America, but is now about to have an exposition building for the purpose of showing the products of mind and labor. It will cover an entire block of ground of about three acres in extent. It is anticipated that this great building will be completed in time for use in 1881.

Notice.

HUNTINGDON, Pa., June 21, 1880.

Miller & McCarthy, Mount Union, Pa.

DEAR SIRS: The Miller's Patent Composition Burr Rubbers bought from you last spring are certainly the boss rubbers. We hardly know how any well-regulated mill can be run successfully without them. Having had practical experience in the milling business for the last 15 years, we know whereof we speak.

Very respectfuliy, HENRY & CO,
Proprietors Henry Flouring Mills.
A. L. STEPHENS,
Head Miller.

AMONG the many new and useful inventtons on exhibition at the Millers' International Exhibition, Cincinnati, of interest to millers, as was seen, there was none of more practical value to millers using steam power than the Kellam Patent Steam Damper Regulator, exhibited by the proprietors, Messrs. Kellam & Waterman, of Detroit, Mich., attracting crowds of admirers and receiving the highest praise of the best mechanics in attendance, who carefully examined its working. The owners also show testimonials of many of the best manufacturing establishments of the country who have used them for some time and unanimously say they would not be without them. At the prices they are sold no steam boiler should be without them. Not only are they great economizers of fuel in which way alone they pay for themselves many times each year, but they are perfect regulators of the pressure of steam on boilers, allowing no variation, giving regular motion to machinery and insuring the boiler against explosion from over-pressure. They can be readily attached to any boiler.

Milling in the Future.

What the grand future of the milling industry will be, it is impossible for one at the present time to conjecture. During the past decade the changes and improvements have been so radical and numerous that we may reasonably believe they may still perhaps be as many and important in the next. At present, the roller milling system seems to be the one in favor with many of the most advanced millers, while many others claim that the use of rollers in flour milling in America is only a costly experiment, which will, after a few years, be discountenanced by all, and they will fall back to the old system of grinding with stone, with perhaps a better understanding of a proper dress, balancing and truing the faces thereof, etc.

Many of our studious millers who have paid great attention to all the modern innovations, are inclined to think that a sort of a medium course will be the final result in which both stones and rollers will be used. At present it is difficult to find two millers in the same town who have views in accord with one another. In the meantime, experimenting will still go vigorously on, and we have heard some, more enthusiastic than wise say that the happy time would yet come when 110 per cent of flour would be produced from wheat. We have no objection to their thinking so, but do not hesitate to say that this impossible dream can never be realized until our mathematicians prove that 2+2=5.

Commercial Statistics.

From the preliminary reports of the Treasuy Department for the fiscal year ending June 30, 1880, the following statement concerning the foreign commerce of the United States for the current year and the previous twenty years, are compiled for the readers of the UNITED STATES MILLER:

TABLE A—SHOWING THE VALUES OF IMPORTS AND EXPORTS OF MERCHANDISE FROM 1860 TO 1880, INCLUSIVE, AND THE ANNUAL EXCESS OF IMPORTS OR OF EXPORTS.—SPECIE VALUES.

Year ended June 30.	Total Exports.	Imports.	Excess of Exports over Imports.	Excess of Imports over Exports.
	$	$	$	$
1860.....	333,576,057	353,616,119	.....	20,040,062
1861.....	219,553,333	289,310,542	.....	69,756,709
1862.....	190,670,501	189,356,677	1,313,824	.....
1863.....	203,964,447	243,335,815	.....	39,371,368
1864.....	158,837,988	316,447,283	.....	157,609,295
1865.....	166,029,303	238,745,580	.....	72,716,277
1866.....	348,859,522	434,812,066	.....	85,952,544
1867.....	294,506,141	395,761,096	.....	101,254,955
1868.....	281,952,899	357,436,440	.....	75,483,541
1869.....	286,117,697	417,506,379	.....	131,388,682
1870.....	392,771,768	435,958,408	.....	43,186,640
1871.....	442,820,178	520,223,684	.....	77,403,506
1872.....	444,177,586	626,595,077	.....	182,417,491
1873.....	522,479,922	642,136,210	.....	119,656,288
1874.....	586,283,040	567,406,342	18,876,698	.....
1875.....	513,442,711	533,005,436	.....	19,562,725
1876.....	540,384,671	460,741,190	79,643,481	.....
1877.....	602,475,220	451,323,126	151,152,094	.....
1878.....	694,865,766	437,051,532	257,814,234	.....
1879.....	710,439,441	445,777,775	264,661,666	.....
1880*.....	835,793,924	667,885,565	167,908,359	.....

*These figures will be slightly changed by returns to be received from distant ports of the country.

In addition to the above, in order to embrace the aggregate volume of trade and commerce, it is necessary to supplement the following:

TABLE B—SHOWING THE VALUES OF IMPORTS AND EXPORTS OF GOLD AND SILVER COIN AND BULLION FROM 1860 TO 1880, INCLUSIVE; ALSO ANNUAL EXCESS OF IMPORTS OR OF EXPORTS.

Year Ended June 30—	Total Exports.	Imports.	Excess of Exports over Imports.	Excess of Imports over Exports.
	$	$	$	$
1860.....	66,546,239	8,550,135	57,995,104	.....
1861.....	29,791,080	46,339,611	.....	16,548,531
1862.....	36,887,640	16,415,052	20,472,588	.....
1863.....	64,156,611	9,584,105	54,572,506	.....
1864.....	105,396,541	13,115,612	92,280,929	.....
1865.....	67,643,226	9,810,972	57,833,154	.....
1866.....	86,044,071	10,700,092	75,343,979	.....
1867.....	60,868,372	22,070,475	38,797,897	.....
1868.....	93,784,102	14,188,368	79,595,734	.....
1869.....	57,138,380	19,807,876	37,330,504	.....
1870.....	58,155,666	26,419,179	31,736,487	.....
1871.....	98,441,988	21,270,024	77,171,964	.....
1872.....	79,877,534	13,743,689	66,133,845	.....
1873.....	84,608,574	21,480,937	63,127,637	.....
1874.....	66,630,405	28,454,906	38,175,499	.....
1975.....	92,132,142	20,900,717	71,231,425	.....
1876.....	56,506,302	15,936,681	40,569,621	.....
1877.....	56,162,237	40,774,414	15,387,823	.....
1878.....	33,740,125	29,821,314	3,918,811	.....
1879.....	24,997,441	20,296,.00	4,701,441	.....
1880*.....	17,142,919	93,034,310	.....	75,891,391

*These figures will be slightly changed by returns to be received from distant ports of the country.

For only two years — 1861 and 1880 — during the past twenty years, has there been an excess of imports over exports of coin and bullion.

The "balance of trade" has been in our favor uninterruptedly for the past five successive years, but, as will be seen by reference to table A, the tide has taken a sudden ebb which presages another series of years like those from 1863 to 1873, when the trade was against us.

It is notable that our foreign trade is essentially made up of the raw products of the country, grain and provisions alone last year being $398,000,000 of $836,000,000, the total of all exports. The exports of grain have been excessive during the past year, owing to an extraordinary want in the consumptive centres of the Old World. The balance returning to us has given the surplus of gold and silver shown in the exhibit for 1880, and corresponds quite nearly with the increase in provision and grain exports, thus: increase in imports of coin and bullion in 1880 over 1879, $80,592,832; increase in exports of grain and provisions, $86,093,065; showing a difference of only $5,500,000, which is not much in excess of the amount of freights and expenses paid to foreign factors and carriers.

Thus there seems to be a co-relation between the extraordinary demand for and export of food supplies, and the anomalous influx of specie at the corresponding period.

Only a reccurrence or continuance of this extraordinary demand for our raw products can give any reasonable grounds for belief that the influx of the precious metals will continue. It is also a notable fact that as the excess of our exports were entirely made up of raw products of the country, so the balance of trade due us was adjusted by the return of native products of this country—gold and silver. Articles of American manufacture, as yet, are a very insignificant factor in the foreign trade of the country, and when the traffic in raw products is elimintated, in which there is virtually unrestricted trade, we should have virtually no foreign trade at all, except in such articles as we are forced to buy from other nations, because we cannot produce them, for which we must pay in bonds or other things which no other country can produce of like desirable quality at like reasonable price, or in such adequate quantity.

SUBSCRIBE for the U. S. MILLER. Only $1 per year.

Grain and Provision Exports for 1879 and 1880.

The following table, compiled from the advanced reports of the United States Bureau of Statistics, shows the amount in quantity and value of the exports for the fiscal year ending June 30, 1880, as compared with the preceding year, also the comparative prices of the articles exported:

DESCRIPTION.	1880. Measure.	1880. Value.	1879. Measure.	1879. Value.	INCREASE. Measure.	INCREASE. Value.	DECREASE. Measure.	DECREASE. Value.	1880. Average Price.	1879. Average Price.
Grain and Grain Products—		$		$		$		$	$	$
Barley, bu.....	1,121,003	779,201	702,037	390,263	418,966	288,938	.....	.....	.694	.557
Indian Corn, bu.....	97,471,420	54,907,9-1	85,575,905	40,331,995	11,895,455	12,575,986	.....	.....	.543	.471
Corn Meal, bbls.....	343,923	964,387	385,307	1,022,359	.....	.....	41,384	57,969	2.80	2.65
Oats, bu.....	628,607	258,531	4,654,794	1,388,962	.....	.....	4,026,187	1,130,431	.411	.298
Rye, bu.....	2,911,844	2,362,308	4,848,249	3,162,290	.....	.....	1,936,405	739,982	.811	.639
Wheat, bu.....	49,139,393	185,892,168	119,063,535	127,392,310	.....	58,499,858	.....	.....	1.246	1.07
Wheat flour, bbls.....	5,787,967	34,062,186	5,350,609	28,148,323	437,356	5,913,863	.....	.....	5.88	5.26
Total Breadstuffs.....	.....	$277,226,762	.....	$201,776,499	.....	.....	.....	.....	.....	.....
Provisions and Tallow—		$		$		$		$	$	$
Beef, fresh, lbs.....	84,008,633	7,397,365	.....	.....	.....	.....	.....	.....	.085	.09
Beef, salted, lbs.....	44,634,205	2,802,818	.....	.....	.....	.....	.....	.....	.063	.163
Bacon and Hams, lbs.....	695,180,766	50,560,706	726,574,539	50,572,739	.....	.....	30,303,773	12,033	.072	.069
Butter, lbs.....	38,873,172	6,626,635	38,152,016	5,403,629	721,156	1,223,006	.....	.....	.17	.141
Cheese, lbs.....	196,875,167	12,120,526	141,042,089	12,532,324	.....	.....	14,166,922	411,708	.096	.075
Lard, lbs.....	372,178,542	27,774,584	324,602,713	22,677,576	47,575,783	5,027,008	.....	.....	.075	.069
Pork, lbs.....	96,712,790	5,785,151	83,459,502	4,759,991	13,253,288	1,035,160	.....	.....	.06	.057
Tallow, lbs.....	109,394,635	7,606,075	99,300,122	6,886,118	10,094,513	719,957	.....	.....	.07	.069
Total Provisions.....	.....	$120,673,860	.....	$110,631,658	.....	$10,042,202	.....	.....	.....	.....
Grand Total.....	.....	$397,900,622	.....	$311,807,557	.....	$86,093,065	.....	.....	.....	.....

The above reports of the Bureau of Statistics, for the fiscal year ending June 30, 1880, show a decrease, both in quantity and value, of the foreign exports, of corn meal, oats, rye, bacon and hams and cheese. Barley, corn, wheat and wheat flour, beef, fresh and salted, butter, lard and pork, show a large increase; indeed, but for the extraordinary export of these commodities, the balance of foreign trade would have been against us at the end of the year.

Next year, with the tariff that handicaps the export trade in manufactured articles, and a less demand for provisions, owing to better crop yields in European countries, it is almost a certainty that there will be a decrease from the figures, shown in above table, to such an extent as to throw the balance of trade against us. This unfortunate condition will be directly attributable to the insane policy of pseudo protection, which has put an artificially high price on all goods that are open to the competition of the commercial world. We cannot compete with other nations in manufactures, and can only sell them our raw products after all other nations have furnished their quota, as, owing to the artificial high price of living and conducting any business in this country, it is the last to draw from, and the first to be abandoned by foreign consumers, even on the raw products of the country. When necessity requires a supply of anything produced by the United States, a general canvass of the whole world is made, and the deficit is reluctantly taken from us. We now furnish the outside world what it cannot get elsewhere, and it sells us what it cannot sell elsewhere — an independent but quite precarious position for a nation to occupy.

THE gross receipts of the Suez canal in 1879 were $6,190,000 against $6,480,000 in 1878, out of which were paid expenses and fixed charges (including the 5 per cent statutory dividend on the share capital) to the amount of $5,610,000, leaving a surplus of $580,000 which was divided among the shareholders. The average tonnge of the vessels using the canal was 2191 tons in 1879, against 2656 tons in 1878.

AN exchange sums up our native "foreign products" thus: Russia leather is made in Connecticut, Bordeaux wine is made in California, French lace is woven in New York, Italian marble is dug in Kentucky, Marseilles linen is produced in Massachusetts, English cassimere is made in New Hampshire, Spanish mackerel are caught on the New Jersey coast, and Havana cigars are rolled out by the million in Chicago.

MINNEAPOLIS' GLORY.

The Largest and Finest Flouring Mill in the World.

A Detailed Description of the Magnificent Washburn "A" Mill.

Its Daily Capacity Calculated to Astonish the Uninitiated—3,000 Barrels of Flour in Twenty-four Hours.

[From the Minneapolis Tribune.]

The first object of interest, now-a-days, in Minneapolis, which is sought by strangers, and by would-be residents, is that locality which is known as the mill district, a term, by the way, that, however indefinite it may appear upon first hearing the term used, is fully understood and appreciated after a short visit to the magnificent structures which are therein located, and which are looked upon by every Minneapolis citizen with commendable feelings of pride and gratification. Most prominent among these mills, by reason of their size, and by the unequaled largeness of their daily productions, is the group of the three known as the "Washburn Mills." Of these, which rank according to their size in order as the A B and C mills, it is not our purpose at this time to write, save in a general way, with the exception of the first-named, which has just been completed, and which occupies the site of the former A mill, a structure that, previous to its destruction by fire and explosion on May 2, 1878, ranked among the flour mills of the United States then, as its successor does to-day, viz.: as the largest, costliest, and most complete its kind.

Ex-Gov. C. C. Washburn, to whose untiring energy and public-spiritedness Minneapolis owes much of her present prosperity, undismayed by the disaster which, at the time referred to, overtook the A mill, and in the space of a few seconds transformed the fine seven-story building, of which he was the sole owner, into a mass of unrecognizable ruins, immediately began the erection of a still larger mill upon its site. No better evidences of the thoroughness which characterized the work, and of the successful carrying out of the original plans which were to eventuate in the erection of the finest mill in the world, are needed than those which appeal to the eye and the sound judgment of practical mill-wrights, as well as to the general public, in the finished structure and its perfect machinery. As viewed to-day in its completeness, the mill has no peer in the world. Its machinery has been constructed with especial reference to the exacting demands of the flour market, and with the intention on the part of its proprietors of turning out a better grade of flour than any of its competitors, whether of large or small capacity. To produce these results was necessary primarily, a practical knowledge on the part of the designer of the process of flour manufacture, secondarily the expenditure of a vast sum of money, and, thirdly, the purchase of such machinery only as had been thoroughly tested and found to work satisfactorily under such conditions as would govern the vast accumulation of the best results of mechanical ingenuity which would be gathered under the Washburn A roof. All these requirements were met at the outset, and not only were they satisfactorily carried out, but, by the inventive genius which ex-Gov. Washburn is known to possess, were such novel improvements made as resulted in the creation of a mill differing in many essential particulars from any other known. The view of the Washburn A mill that is obtained by passengers over the Chicago, Milwaukee & St. Paul Railway, and such us view it from Washington avenue, while calculated to impress them with its magnificent proportions, gives but a faint idea of its real size. To fully appreciate this, one must pass around the mill on the Seventh avenue side, and then standing on the canal platform, take in its length, breadth and height.

Standing thus on the platform, we begin to appreciate the journey that is before us, ere a tour of the mill will be made. All the available space between the canal and Second street is occupied by the vast structure, its frontage on Seventh avenue south being 244 feet, while on the canal front and on Second street there is a frontage of 100 feet. Seven stories of the mill proper and an attic, or in reality another story, with a tall cupola on the top of this, (the summit of the later being 175 feet above the canal platform) make up its height. Alongside the mill on Seventh avenue south is a two-story addition, independent of the mill however, in which are located the private office of ex-Gov. C. C. Washburn, the general offices, for book-keepers, etc., and back of this the steam-heating apparatus for the mill. The offices on both floors are finished elegantly in red oak, while the apartments used by ex-Gov. Washburn are fitted up in an elaborate manner with Brussels carpets, easy chairs, and all the usual appurtenances of a gentleman's private business appartments.

Some idea of the excellent railroad facilities enjoyed by the mill may be gathered from this point, as we perceive that an arched tunnel extends through the mill for the passage of railway cars, and that its upper, or Second street front, faces the tracks of the Minneapolis & St. Louis, and Chicago, Milwaukee & St. Laul railroads.

The exterior having been casually scrutinized, we proceed to enter the centre door of the structure, but here our attention is arrested by an inscription on a large marble tablet over the door, which recites the destruction of the former A mill on the evening of May 2, 1878, and also gives the names of the employes who were killed upon that occasion. The sentiment, "Labor, wide as earth, finds its summit in Heaven," is fitly traced upon the enduring marble.

An entrance is now effected, and we perceive that we are on the first floor of the mill, where along on the right and extending for 236 feet is the main line of shafting, which, under the impulse afforded by a Boyden water wheel under a 40-foot head, runs the entire machinery in the mill. The iron hurst frames rest on stone and brick foundations, and these on the solid primeval lime stone ledge. The first floor also holds a subterranean wheat bin having a capacity of 80,000 bushels of wheat, which also extends up into the second story. As the fine Reedy elevator stands ready to carry us up, we avail ourselves of its proximity and rise swiftly to the second or

GRINDING FLOOR.

Here we perceive that the railroad tunnel, before referred to, reduces the size of the center of the room, but that this space is utilized by ten pair of 4½ feet ending stones, all in motion. Occupying the west side we find three rows of granulating wheat rolls, 42 in number, all noislessly at work under the eyes of carerul attendance. In the east end we find sixteen smooth chilled-iron rolls (S. M, & F.), and ten beautiful porcelain rolls, fine specimens of mechanical skill. Ranged upon one side of this room are also 10 pairs of French buhrs, surrounded by the most elegant curbs and fixtures that the reporters eye had ever rested upon. The conveyors, the glass indicating receivers and all the wood-work is of the most costly description. The office of the head miller, which is also located on this floor, is a large, cozily furnished apartment, which, however, judging from the activity of that gentleman, is but little used as his resting place. Leading out of the second floor at the north side is a stairway, which, if followed downward, ushers visitors into Gov. Washburn's office, while on a level with a landing are the other offices elsewhere referred to.

THIRD FLOOR.

The third or packing floor is one of the busiest in the building, and here we begin to see theresult of subjecting wheat to so much rolling, grinding, bolting and purifying. Here are seven Eureka packers, eoch rapidly filling clean looking barrels with snow white flonr, and back of these are seven square iron reduction bins for wheat and middlings. which supply the rolls on the floor below with material. On the left we perceive evidences that although the mill has but just started it has succeeded in turning out a large quantity of flour, elegantly branded barrels being piled up to the ceiling and many rows deep.

FOURTH FLOOR.

Pursuing our investigations further, we rise like flour dust to the fourth or purifying floor. Here in the east end we find several large iron structnres, looking like immense boilers turned up on end. twenty of them, we are told, being used as middlings bins and four as flour bins. These bins are truely novelties as they are the only iron flour and middlings bins in use in any mill in the United States. Back of these bins on the Seventh avenue side of the building is ceing prepared a lunch department where the proprietors and clerks will take their noon-day lunch.

The west end of the fourth floor is occupied by eight Richmond brush machines, six chilled iron smooth rolls, 25 Standard purifiers, and 17 sections of the Washburn patent dust house. Four large Sturtevant fans exhaust the air which haa been blown into the dust house from the puribers, where the dust is arrested by flannel screens, and the air returned in its normal condition to mingle again with the air in the mill.

FIFTH FLOOR.

The fifth floor being reached one begins to wonder at the immensity of the building and to conjecture what the capacity of the mill may be. In response to the question or capacity we are informed that the number of barrels of flour expected to be turned out of the mill when all of the machinery is located will be 3,000 barrels each day. Think of it, you who may be located far away from "the big mills."

The fifth flour at the east end contains four boiler iron flour bins (circular), five Standard and four Woerner purifiers. Located on the west end are four double cockle machines, eight in all, two centrifugal reels, two more iron flour bins that reach through the fourth and fifth floors' 24x8 feet in diameter, with a capacity of 250 barrels each. Here are also twenty-five Standard purifiers (enclosed) and seventeen sections of the Washburn dust house.

THE BOLTING CHEST FLOOR.

The sixth of the stories that make the grand whole, has now been reached and here in the west portion we find one large centrifugal flour mixing machine, and a Sturtevant fan in connection with ten sections of the Washburn dust house. Upon this floor are also eight centrifugal reels, two Pott's wheat grading machines, another Sturtevant fan and eleven sections of Washburn's dust house, eight middlings sorting machines forty feet long, and sixteen aspirators—all placed with extreme care so that their connections with the other machines is secured with the least possible length of conveyors. There are also, all told, on this and the seventh floor, 140 reels enclosed in most perfectly jointed and nicely panelled cases, a piece of work that any millwright might be proud of.

We preceive on the seventh floor, that the mill is divided into two parts and a large car mounted upon a substancial track is the means used to convey purified middlings from one side to another, where it is made into flour. By this means a perfect equality of working is assured, each side performing its proper functions without loss of time. This reduction system is worth a careful scrutiny.

The seventh floor holds sixty-four reels, four middlings sorting machines, each fourty feet long, and four Richmond grain separators. It is well worth while here to note that all the elevators in the mill are perfectly horizontal, no crooks or turns being observable. This is a remarkable feature and one not often noticed in a large flour mill.

EIGHT FLOOR.

Moving once more upward we reach the eight or top-most floor modestly styled by the owner an attic but which contains more space than any public hall in the city. Here are the elevator heads and spouts, the heavy timber framework carrying the horizontal main belting together with wheat bins and miscellaneous machinery.

THE CUPOLA.

A tour through the mill could hardly be said to be complete without ascending into the cupola and gazing from thence upon the magnificent prospect which is spread out before the observer. The view is most enchanting and cannot be appreciated by those who have not enjoyed the privilege that was accorded the writer. The course of the Mississippi and Minnesota rivers can be traced for miles and every feature in the landscape plainly seen. To appreciate the beauty of Minneapolis as a whole, it is necessary to stand far above it in the mill cupola and gaze on its broad avenues, its elegant residences and the thousands of wide branching shade trees. Gov. Washburn has caused a wide piazza to be laid outside the cupola on its four sides, where the fortunate few who reach its elevation may wander and admire the landscape.

As we pass hurriedly through the mill, we noticed many things that do not necessarily enter into the construction of a flour mill. First and most noticeable are the precautions taken against fire. Upon each floor, coiled up for instant use, and already attached to six-inch stand pipes that pass up through all the floors at both ends of the building is about 100 feet of rubber pipe with a large nozzle attached. These are supplemented on each floor with numerous Babcock extinguishers and barrels of water, over which are hung red buckets, properly marked and always in place. There is also a chemical engine stationed in the building that can be brought into instant service. By a system of electric bells and speaking tubes each floor can be brought into instant communication with any other in the vast building, and if necessary every man in the mill placed where most needed.

There is another feature worth noting, and that is that this mill is the only one in the United States driven exclusively by belting and consequently about the only one that is noiseless in its operation.

If the floor space of the mill were laid out on open prairie it would be found to extend over four acres, there being 180,400 square feet of surface.

The total amount of masonary in the structure is 15,200 perch.

Two million seven hundred and thirty-five thousand feet of lumber was used in its erection. It has 365 windows and doors, one for every day in the year. The iron that composes the shafts, pulleys, gears, etc., amounts in the aggregate to 350,000 pounds, and was furnished by the North Star Iron Works, O. A. Pray, G. Menzel & Co. and Stout, Mills & Temple, of Dayton, Ohio.

The combined weight of the rollers and frames amounts to 170,000 pounds.

There are eight miles of gas and water pipe in the mill. The belting cost over $12,000, and $3,000 was paid for paint. The bill for whitewashing amounted to over $1,200. Think of that ye sable slingers of the brush. There would have been a bonanza.

Two hundred kegs of nails and spikes were used, and 2,000 gross of screws. Thirteen thousand elevator cups were necessary to provide proper means of carrying up the wheat, middlings and flour. The average number of millwrights employed was 125. They commenced work on the interior of the mill on Feb. 1st, 1880. Truly they have done well.

Messrs. E. P. Allis & Co., of Milwaukee furnished the aspirators, air purifiers and ten porcelain rolls besides gearing and other machinery.

Messrs. Stont, Mills & Temple, of Dayton, Ohio, furnished all the corrugated and smooth iron rolls besides the main shafting and wheel gearing.

Fender & Cuthbertson, of Minneapolis, furnishep fifty-five of their well named Standard purifiers.

Janney, Brooks & Eastman and Smith & Day, of this city, furnished the bulk of the hardware.

John T. Lucas, of this city, furnished the elevator cups.

The Washburn machine shop, a modest little building under the railroad track near the C. mill, has played a very important part in the erection of this mill, its nearness to the scene of action, and its very thoroughly equipped service being duly appreciated by the mill owners and the millwrights. Ground is now being broken alongside the mill preparatory to the erection of an elevator and cleaning house which will be of a size commensurate with the needs of the mill, and into which all the cleaning machinery will eventually be removed. The structure is to be of stone, seven stories high, and thirty-five feet long by ninety-four wide.

To Mr. Wm. De la Bare, the engineer and superintendent, is largely due the credit that belongs to the master mind that conceived and executed the plans. The mill speaks his praise louder than words could, however they might be multiplied. Mr. F. Walgenaunt, the head miller, who has but iecently came to this city from Budapest, Hungary, has in a great measure directed the location of the machinery and is now engaged in turning out a very fine quality of flour. Messrs. U. H. Odell and Chas. Jones, the millwrights who had charge of the construction in their several departments, and Mr, H. C. Rau, a competent draugntsman, have received praise for their fine work.

Throughout the mill are conspicuously placed very stringent rules for the government of the employes in the matter of keeping the mill neat and tidy. Gov. Washburn insists that the mill shall be kept as clean as a lady's parlor, that no rubbish of any kind shall be allowed to accumulate anywhere in the mill, "the rolls must be kept clean," "spitting on the floor is positively prohibited," and the woodwork of the walls must not be defaced.

"The employes are expected to toke a personal interest in the mill, and cheerfully asks to make it what the proprietor has determined it shall be, the model mill of the world." The responsibility of coraying out the rules is left with the head man on each floor, and authority is placed with the heod miller to see that all the requirements are fulfilled.

Tne fignres and facts herein given are not to be taken as indicating all the machinery that is to be located in the mill. But one-half of the mill is equipped with machinery. The south side is now being prepared to receive its completement, when the capacity of the mill will be 3,000 barrels of flour per day.

Operative Millers.

At the last meeting of the National Associa- of British and Irish millers, the chairman, Mr. Westley, in referring to the proposed private publication of the proceedings, noticed an objection of a most pertinent and conclusive character. Were the reports of the proceedings, said Mr. Westley, circulated only among members, the operative millers, except to a limited extent, would have no knowledge of them, and it was of as much importance that these should become acquainted with what was being done by the association in the promotion of improvement in the methods of flour manufacture, as it was for the employers. By the publication of the proceedidgs in the milling journal, Mr. Westley continued, a thousand operatives would see them for one who would not, were their publication limited to members only; and there is no doubt but the speaker gave expression to a fact which will be recognized by all intelligent members of the trade.

The present article is addressed especially to the class which supplies its title, and its chief purpose is to emphasize, so far as we can, the pertinent remarks made by Mr. Westley to which we have just referred. In his paper, read to the members of the "Utopian Club." Mr. C. said:—"As a matter of "course, we require the very best machinery that can be procured for our mills; but the best machines, apart from the intelligence which controls them, will not yield the highest results. Power of brain, is after all, the highest power in the mill, and without competently trained operatives it cannot be obtained in its highest efficiency." These words should be remembered by employers and operatives, because they are equally applicable to both in the present circumstances of the trade, foreign competition being an element related to it which ought to have a stimulating effect upon the energies of each. If the employer loses his customers through the greater enterprise and superior manufacture of his foreign competitor, it follows as a matter of course that the operatives will lose their work: and the joint efforts of both should be directed harmoniously and continually for the purpose of averting such a catastrophy.

Recurring for a moment to the reference of Mr. C. to machine power and brain power, it may be noticed that the later is a force in milling which to be productive in the highest degree of the largest results, must be contributed to by both parties. It may be assumed that the employing class, being possessed of the larger share of means and opportunities for the cultivation of the force will naturally contribute its largest share, and that in point of fact, as matters are at present they do bring by far the largest share, of the force in question to bear upon milling. The operative class, however, in their own interest, must set about the untilization of such means and opportunities as they poseess for cultivating the force in order to qualify themselves for contributing a far larger share of the latter than they have hitherto done.

In former and not very distant times, operative millers might have excused themselves for shirking such a duty, on the ground that the means of assisting them in its proformance were extremely few. There were no text-books for the exposition of the theory and practice of milling in the English language, and there were no milling journals in which these were popularly taught. Such an excuse, however, no longer exists, for although there are in point of fact few standard works on milling, in the language, there are abundance of milling journals, English and American, which furnish in the amplest degree the material required for the cultivation of brain power. No man who has the interests of the trade with which he is identified really at heart can afford to neglect the study of the journals devoted to the exposition of its principles and the record of its progress. The man who aspires to be a politician in the highest sense, must not only be a careful student of the past history of his own and other nations, but he must keep himself fully informed with regard to contemporary political facts and phenomena, exercising at the same time his critical or analytical faculty, to enable him to discriminate between those which take their initiation from accident, and which are likely to prove evanescent, and those which, originating in deeply-seated national feelings, mark an epoch in a nation's history and have a permanent influence upon its destiny.

The journals connected with a trade, if conducted with an earnest and intelligent desire to render it the largest benefit, are as essential to the members of the trade as the political journals of his time are to the politician. It is not enough that they should be glanced at casually as a means of filling up an idle moment; their contents must be studied with at least sufficient care to avoid the risk of anything being missed which might be advantageous to the trade. And here also the critical or analytical faculty of the reader must be exercised for the purpose of ascertaining whether the machines and the methods recommended for use in the trade are based upon principles which are likely to yield the results claimed for them. This applies to the principal and subordinate members of the trade, although in a different degree; but keeping ing in mind that at present we are addressing operative millers who have comparatively limited time to devote to study, we may offer some hints in regard to this mode of study.

Millers, like other operatives, may be classed into two chief divisions, viz., those who enter the mill with no higher ambition than to earn a hand-to-mouth livelihood by the least possible personal labor, physical or intellectual, and those who adopt the calling with a determination to rise from the operative platform to that of the employer. It is of course probable that some of the first class may become great by having "greatness thrust upon them," but they can never achieve it by any effort of their own; their natural position is that of the "hewer of wood and the drawer of water," and as their only study is "how not to do it," it would be superfluous to give any hint respecting the method of setting about the task to the best advantage.

It is in the second class those can be found who, sooner or later, acquire a degree of success proportionate to the efforts they have put forth to obtain it, and to these we would say, do not let a day pass of which some portion, however small, is not devoted to study. Great results can be secured by the conscientious and systematic utilization of small portions of spare time. "Take care of the pence," says the prudential proverb, and the pounds will take care of themselves." It is from the pence indeed that the pounds grow, and it is from accumulations of knowledge, gained by the right use of momentary gleanings that large stores of that precious commodity are ultimately garnered.

We are well aware that the operative students may find reading, and the application of thought to the subject of his reading, so as to fairly master it, to be a somewhat irksome task after a day's work. When the physical powers suffer from fatigue, the mental faculties are sympathetically affected in a similar manner. In such circumstances the body claims rest, and the mind, as if acting in collusion with the latter, gives its support in favor of the claim. The support, however, is not by any means disinterested, being at the very least liable to a suspicion that the mind would willingly share the relaxation which is claimed for its partner. Rest, however, does not necessarily mean a total cessation from labor, a change of employment being generally the equivalent to it. Under the influence of the depression which results from physical fatigue an effort, no doubt, is required to be made to induce the mind to exercise its proper functions, but if the effort is made and continued, a time will speedily arrive when there will be no necessity for making it. In other words, study will have been converted into a mental habit, ane what was irksome at the outset will have become pleasant. The great thing in the early part of the process is not to prolong the study to too great a length. The object is not to get over so much ground, to read so many pages, but to master thoroughly the meaning of what is read, although it should be only a single page. The interest taken in any study is in proportion to the extent to which its subject is grasped. Until the understanding takes part in the reading, every book is written in an unknown tongue, although the words be familiar to the reader. The moment the operative student gets his understanding enlisted in his work the latter is transformed from a task into an enjoyment, and at this point progress in his studies, in the real sense of the term, commences. In knowledge preeminently, increase of appetite grows by what it feeds on, and progress once commenced continues rapidly.

In the milling journals, which are fairly within the reach of the operative miller, subjects are brought forward and discussed from month to month, a knowledge of which is absolutely essential to him if he has the ambition to succeed in his trade and the desire to give his employer intelligent, and consequently efficient, co-operation in checking the foreign competition which now threatens the interests of both. The intelligent workman is never satisfied until he has a full appreciation of the "reason why." His intelligence makes him impatient of mere dogma, however respectably supported, and he has a proper scorn for the notion that, because the mode in which an operation is performed has been consecrated by long use, it follows, as a matter of necessity, that there is no other and better way in which to perform it. As a thinker, he naturally subjects all that comes before him to the analysis of thought, endeavors to extract from it what is excellent and that which is useless, and which, indeed, may be worse. In the manufacture of textile fabrics many of the most valuable improvements in the machinery used therein owe their origin to the operatives; and in the construction of the tubular bridge over the Menai Straits, the late George Stephenson, the engineer, specially acknowledged the obligations under which he lay to the operatives engaged in the work for valuable suggestions in facilitating the progress of its construction.—*London Miller.*

A Texas Mill.

DESCRIPTION OF THE MILL OF MESSRS. ASHFORD & BOFFINGTON, OF FORT WORTH, TEXAS.

[From the Fort Worth Democrat.]

Most of the readers of the *Democrat*, especially those within a radius of fifty miles from Fort Worth, are well acquainted with the firm of Ashford & Boffington, proprietors of the City Mills. They are shrewd operators, whose views have weight in the commercial world, and, as an indication of their faith in the future of this city, we have only to present the improvements which are but just completed in their mill business. Right in the teeth of all the discouraging circumstances attending the preparations for carrying the railroad terminus west of this city, these gentlemen have torn out their old runs, and, at an expense of nearly fifteen thousand dollars, added to their building and filled it with the finest and most improved machinery that the country affords, for making "patent process" flour. As a tribute to the enterprise of these gentlemen, a reporter of this paper visited the City Mills yesterday to see for himself what they had done. We met Mr. Ashford, who introduced us to Mr. W. Nickel, who he said was half French and half Dutch, as the millwright superintending the erection of the machinery, and to Mr. Alex. McPherson, head miller, who filled the same position for McKeen Bros., Terre Haute, Ind., for six years, and for Smyser & Milton, Louisville, Ky., for two years. We also met Mr. Louis Klopner, chief engineer, and D. B. Dupres, state agent for these mills. Under the escort of these gentlemen, the reporter was shown through the establishments from foundation to roof, and made notes as follows: In the engine room the first thing that attracts attention is the power which runs all the machinery in the building. It is an immense automatic Buckeye engine of 80 horse-power, manufactured at Salem, O., and as a sample piece of machinery of its kind is a beauty.

The boilers rest on a double wall, with hot air escape to prevent in from bursting out at the sides. An exhaust pipe returns all steam, after it has been used in the engine, into a heater, from which cold water is transferred to the boiler just at the boiling temperature. In this room is also placed a Knowles pump, which, in case of fire, will throw water through hose to all parts of the building and over the lumber yard attached. An iron lathe which will turn any kind of shafting, pulleys, etc., will also be placed in the engine room, and prove a great convenience to this community.

The mill machinery consists of four French forty-two inch wheat burr stones, —the best of their kind; two Currier middlings mills, manufactured at Oskaloosa, Iowa, and which are run at the speed of 800 revolutions per minute; two warehouse separators, one Kurth's cockle, coriander and oat separator, from Milwaukee; one Eureka smut machine, made by Howes, Babcock & Co., Silver Creek, N. Y. The wheat burrs, shafting, pulleys and hurst frames were furnished by the Richmond City Mill Works, Richmond, Ind. The bolting apparatus includes eight 18 feet 6-inch reels, 32 inches in diameter, made of silk by Huntley, Holcomb & Co., Silver Creek, N. Y. This machinery is all first-class, and was bought especially for the preparation of patent process flour. This grade of flour is comparatively new in this country, especially that ground at home mills. There are but about two first-class mills of this kind in the State. A short description of this process may not be uninteresting. The grain goes from the stock hoppers to the two warehouse separators, where all chaff, straw, etc., is removed from it; thence to the cockle and oat separator; thence to the smut mill; thence to the brush machine; thence to the magnet, which holds every particle of metal that may be in the wheat. The grain is, by passing through these machines, cleansed of all dirt, chaff, straw, smut and other impurities. It then passes from the hoppers through the patent heaters to silent glass feeders and between the burrs; thence to a coarse bolting chest, where the bran is removed. The middlings then pass through dust reels, which remove all fine particles of dust, and on to the purifiers, which remove all furz, specks and impurities; thence to the middlings mills, and again elevated to the bolting reels, which remove all impurities there may be, and then to the packer, whence it emerges in sacks as patent process flour. The tailings go through the stones again and are bolted low grade flour. The bran goes through the duster, which separates all flour, and thence to the packer. This is merely an outline of the process. We have not space for minute description of each machine.

The mills have a capacity of 200 barrels of flour per day. The bins will hold 10,000 bushels of wheat. By the time the new corn crop is ready for grinding, Messrs. Ashford & Boffington will be prepared to furnish fresh meal also, in any quantity. When gentlemen spend their money in improvements of this magnitude, it does not look very much like Fort Worth was on the retrograde.

Possible Origin of the Human Race on the American Continent.

Prof. Flowers, in a recent lecture on the "Anatomy of Man," before the London Royal College of Surgeons, discussed at some length the origin of man on the American continent. The views till lately held as to the peopling of America, may, he said, be grouped under two heads: 1. That the inhabitants of that continent were a distinct indigenous people, created in the country in which they were fonnd, and therefore not related to those of any other land. This is the theory of the Polygenistic school, but is probably not held by many scientific men of the present day. 2. The monogenists mostly believed that they are descended from an Asiatic people, who, in comparatively recent times, passed into America by way of Behring Straits, and thence spread gradually over the whole continent, as far as Cape Horn, and that their nearest allies must therefore be looked for in the northeastern regions of Asia. It has been thought by those who have held the same general views, that at all events a partial repeopling of the American continent may have occurred from Southern Asia, by way of the Polynesian Islands, or from North Africa, across the Atlantic.

The discovery of the great antiquity of the human race in America, as well as in the old world, has led to an important modification of these theories. The proof of a very considerable antiquity rests upon the high and independent state of civilization which had been attained by the Mexicans and Peruvians at the time of the Spanish conquest, and the evidence that civilization has been preceded by several other stages of culture, following in succession through a great stretch of time. But the antiquity of the quasi-historical period thus brought out, is entirely thrown into the shade by the evidence now accumulating from various parts of the United States, Central America, and the Pampas, that man existed in those countries, and existed under much the same conditions of life, using precisely similar weapons and tools as in Europe during the pleistocene or quarternary geological period, and, perhaps, even further back in time. As in Europe, his works are found associated with the remains of *Elephas primigenius*, and other extinct mammals, so in America are they found in contemporary deposits with those of *Elephas columbi*. If the inductions commonly made from these discoveries be accepted, and the fact admitted that men lived both in Europe and America before the surface of the earth had assumed its present geographical conformation, the data from which the problem of the peopling of America is to be solved are altogether changed.

Recent paleontological investigations, especially those carried on with such great success in the neighborhood of the Rocky Mountains, show that an immense number of forms of terrestrial animals that were formerly supposed to be peculiar to the Old World, are abundant in the New; indeed many, such as horses, rhinoceroses, camels, etc., are more numerous in species and varieties in the latter, and therefore the means of land communication between the two must have been very different to what it is now. Taking all circumstances into consideration, it is quite as likely that Asiatic man may have been derived from America as the reverse, or both may have had their source in a common centre, in some region of the earth now covered with sea.

Science and Invention.

For the manufacture of opal and alabaster glass the following mixture is now used: feldspar 20 to 78 per cent.; blue lime, 17 to 60 per cent.; and the heavy spar, 5 to 40 per cent.

BONE GLASS.—After extracting the phosphorus from bones a glass can be formed from the residue, which consists of lime and phosphoric acid; the ordinary kinds of glass being composed of sand, and potash, soda, lime and alumina. Bone glass can be worked as readily as any other glass. It has the valuable property of not being attacked by fluoric acid.

REFINING IRON.—Herr Krupp, of Essen, Germany, has recently obtained a patent for a new method of refining iron by means of oxide of iron. The action takes place in a cupola lined with basic brick. By this process it is claimed the greater part of the silica, sulphur and phosphorus are removed from the iron without at all interfering with the carbon.

A CURIOUS and interesting application of magnetism has recently been observed. By writing on a thin plate of hardened steel with a magnetized iron styl, a tolerably permanent magnetism is communicated to the parts of the plate covered by the writing. If iron filings are then brushed over the plate they will adhere to the magnetized portion, rendering the writing visible.

IT is found throughout nature that there is not a substance which, when allowed the free movement of its particles, does not exhibit a tendency to crystallize. Water, at a low temperature, crystallizes into ice; metals, slowly cooled, after melting crystallize, and even the gasses evanescent as they seem, may be made so artificially cold as to crystallize. We eat sugar crystallized into rock candy, or take it as loaf sugar in our coffee. What is glass but crystal?

A COMPANY that has been experimenting in Florida with palmetto for paper-making purposes has met with such gratifying success that they will erect about twenty paper mills in various parts of the State where palmetto trees grow in abundance, and where the transportation facilities are good. Some English paper manufacturers in Canada have been so influenced by the favorable reports concerning palmetto that they have sent an agent to Florida to ascertain what may be its intrinsic merits.

BURNT ALUM.—Ordinary alum is a double sulphate of potash and alumina containing, when crystallized, 24 molecules of water. When heated, it melts in its water of crystallization, and on continued heating this is expelled, leaving a dry powder, known in pharmacy as *Alumena usta*, or burnt alum. That sold at the drug store is often imperfectly dried, and should be placed for an hour or more in a hot bake oven before use. According to C. Bernbeck, the best test for a good article is nearly tasteless when put on the tongue, and takes 12 to 24 hours to dissolve in water. Much of the alum now in commerce contains no potash, the alkali being ammonia. Of course ammonia alum cannot be converted into burnt alum, as the ammonia is expelled at the same time, leaving only sulphate of alumina behind.

A SWISS INDUSTRY.—The production of silk ribbons in Switzerland—which country has succeeded in facing the competition of almost the whole of Europe for certain classes of goods is concentrated principally in and around Basle. The fatal edict of Nantes, which founded the Spitalfields (England) silk industry, also laid the foundations for the ribbon trade of Basle. In 1810 there were already about 600 ribbon looms at work in the Canton of Balse, whose productions reached to about $1,250,000; this amount was doubled in 1830, and it attained its height in 1872, when the amount produced footed up to $12,500,000, and the number of looms was over 7,000, while the whole of Switzerland had 9,156. These 7,000 looms give employment to 6,000 weavers and helpers, and 60 designers, and consumed annually 400 tons of silk, out of which 130,000,000 yards of ribbon were manufactured.

THE GOWER TELEPHONE.—This is a new instrument that has recently been brought out in Paris, that is spoken of very highly by those who have tried it. "The improved instrument consists of a wooden box, fastened against the wall, and having the double speaking tube attached to its under surface. The person who wishes to use the telephone places one or both tubes a few inches from his ears and receives the voice of the speaker at the other end of the line so full and distinctly that involuntarily he starts, looks around to see if the voice does not come from behind him. No effort is required in listening, and the internal mechanism of the instrument is simple and not easily deranged. It can be used with or without batteries, but the best effects are obtained with one or two of La Blanche's cells. These improved instruments, it is thought, will insure the general adoption of the telephone system in Paris."

THE largest coke works in the United States, says the *Iron Age*, are the Morewood Works, which are situated a mile, or so west of Mount Pleasant, in the great coal district of Western Pennsylvania. These works are as yet uncompleted, but a short time will see them in full operation. At the present, the works consist of two shafts and 200 ovens in active operation, and over a thousand acres of coal land. The shafts are distinguished as upper and lower, and are about half a mile apart. But in this short distance the vein of coal dips to such an extent that there is a difference of 71 feet in the distance that the coal has to be raised to the level of the tipple. At each of the shafts there are two large engines of 50 horse-power. The ovens have a capacity of about 300½ tons of coke each per day, and make about 25 cars per day. When the works are completed there will be 500 ovens in blast, and the product will be increased to 80 cars of coke per day. It will require, to make this output, the services of 500 men.

The employment of bisulphide of carbon has of late become much extended, and the substance is now manufactured on a very large scale and used in many branches of the arts. Its peculiar value is exhibited in the following processes and applications, among many others: The complete extraction of fat from bones for the preparation of bone-black, ten or twelve per cent of fat being thus obtained; the extraction of oil from seeds and olives; large quantities of olive oil, rape oil, linseed oil, hemp seed oil, palm oil, and cotton seed oil being procured in this manner; the extraction of sulphur from sulphurous earth, and of bitumen from bituminous rocks; the separation of fat from wool, woolen tissues, and rags from machine shops; the extraction of the soluble principle of spices; the manufacture of yellow prussiate of potash; and for the preparation of a solution of phosphorus in bisulphide of carbon, with which projectiles for rifled guns are filled. All systems of engines, too, can be run with bisulphide of carbon, which, as is well known, boils at 115 deg. Fahr. The construction requires no essential alteration.

BURNT STEEL.—It is sometimes said, in regard to over-heating—or as it is technically termed "burning"—steel, that frequent exposure to extremely high temperature has the effect of extracting the carbon, thus rendering the metal more like iron in its nature. Upon this subject a correspondent to a contemporary writes as follows: What we call burnt steel has just as much carbon in it as the steel that has not been burnt. This was proved by experiments made upon samples analyzed by Prof, Albert Leeds, of Stevens Institute. He found that the amount of carbon in a piece of steel which had been purposely burnt was the same as in a similar piece of steel which had not been burned. The burning, however, was of the steel itself, which contained a large amount of oxide of iron, that is, the metal instead of the carbon burned. The heat does not harm steel or iron, and they may be heated and cooled an unlimited number of times provided they are not allowed in contact with the air, and so take up oxygen. In heating a piece of steel, the amount of blast has much more to do with the burning than the heat. If the extra amount of oxygen which a burnt piece of steel has taken up be taken out of it, it can be made to work just as well as it did before. The proof that the heat does not harm steel, is found in the fact that if steel is put in a closed box and luted up so as to keep out the air, it can be heated and cooled an unlimited number of times without injury.

ELECTRIC INDICATOR FOR STEAM BOILERS.—Amongst the countless applications of electricity, the electric boiler indicator of MM. Lethuiller and Pinel, of Rouen, France, deserves mention. By means of this apparatus the water level in a boiler may be ascertained at any distance from the boiler. The arrangement employed for this purpose consists of an indicating tablet, which may be placed in any part of the establishment, however remote from the boiler-house, in the office of the engineer, or the superintendent, or within reach of the boiler inspector. This tablet is connected with the electric indicator, which is fixed at the top of a vertical tube above the boiler, by two electric conducting wires. At the lower part of the scale of the indicator are placed two pieces of copper, upon each of which is fastened a small platinum plate. These platinum plates are superposed at a distance of 0.08 inch. When the index, which is attached to a vertical rod connected to the float in the boiler, descends, it rests upon the upper plate of platinum, depresses it, and puts it in contact with the lower plate. An electric current is thereby established from a battery connected with the apparatus, causing a bell on the indicator to ring, while at the same time the sign "low water" appears on the tablet. Similar pieces of copper and platinum are fixed at the upper part of the scale, and when the index reaches this limit in consequence of the rising of the float, the bell rings as before, and the indication "high water" is shown on the tablet. In order to remove the words from the tablet, a button is pressed, which returns the indicating parts to their normal position.

The Old Horse Mill.

To comprehend the progress made in the business of millers in this State, it would be remembered that within the memory of persons who are by no means aged there were large portions of the country where even the water mill was still a thing of the future, and where the flour and the meal were ground by that primitive contrivance known as a "horse mill." Old-fashioned bread makers will tell you sometimes with a sigh that no such flour is made now-a-days as that furnished by the water mill. There may be even those who would declare that the best bread they ever ate was made from flour ground by horse power. But they would tell you, too, perhaps, that no turkey ever cooked tasted half so well as the one that was basted over a red-hot fire in the ancient open fire-place with its back log, andirons, and swinging crane; that there has never been such a thing as real corn bread in existence since the art of making corn pone is lost, and various other statements respectable for antiquity, but utterly incredible in these days of elaborate cookery. Horse mills were not at all constructed upon exactly the same model, but the one to be described now was certainly as rude. The machinery to which the horses were attached consisted first of an upright shaft, which was simply a log hewed with an ax, and smoothed skillfully with the adze. The ends of this shaft were trimmed to a circular shape, so that it could turn easily when in place. A few feet from the ground the shaft was mortised for sweeps eight or ten feet in length, which extended outward in a horizontal direction, and to which the horses were attached. The horses walked in a circle, and, of course, turned the shaft slowly around. At the top of the shaft was a wooden wheel from sixteen to eighteen feet in diameter, which moved around just as slowly as the horses pleased. The under side of the rim of the wheel was fitted with cogs made of hickory wood, thoroughly seasoned, and dressed with tallow until they were capable of a polish as fine as mahogany. These cogs meshed in those of a much smaller wheel, which turned upon a horizontal shaft and communicated motion by means of the shaft to another set of cogwheels, and thus to the shaft which turned the upper millstone. In the mill alluded to the horse power was covered by a mere shed, with a roof of clapboards. The mill proper was a structure of hewed logs a story and a half in hight. The millstones were placed in the loft, as the upper half story was called. There was no invention for carrying the grain from the ground up to the hopper. Men shouldered their sacks and carried them up the ladder. It is possible that in later days a rope and pulley were substituted, but genius went no further. The mass of flour and bran together, after being ground, was carried to the bolter, which, as it appeared on the outside, was simply a closed bin about twelve feet in length. Within this chest was a frame covered with fine, close white muslin. The framework was hexagonal in shape, and was fixed upon a shaft which was turned by means of a crank at one end of the bin. The bran and flour when turned into the bin fell upon the inside of the bolter, which, as it turned, gradually sifted out everything except the mere refuse. The fine flour went through the cloth first, then the middlings, and finally the shorts. The bran fell out at the other end of the bolter. The greatest care was necessary in separating the white flour.

Such a mill as this had plenty of business. Men came twenty miles, hauling their wheat in wagons, and sometimes were obliged to wait for a day or two before they could get their grist. The miller's house at night was often crowded with guests, who were accommodated with beds upon the floor. The miller took toll for his work, one bushel in every ten, and if the customer did not have horses to turn the mill, half a bushel of toll was added. One patron of the mill in question always came in a wagon drawn by a huge ox, which drew not in a yoke, but in harness. The patient animal was hitched to the sweep and did all the work usually allotted to three and four horses.—*Cincinnati Gazette.*

The Model Foreman.

A man, to be an entire success as a foreman, must make up his mind to be virtually a student for life, and use every means within his power to acquire knowledge. The education of his heart should never be sacrificed to that of the head, but proper discretion should be observed in all cases. While the brain may be overworked by too close application to study, the health should be carefully considered and the physical constitution kept up to proper standard. A foreman should read upon chemistry, natural philosophy, and the sciences in general. We would also recommend that he read other useful literature, such as histories, narratives, and especially study mechanical drawing, which is indispensable. This course will develope the perceptive faculties, as they are called. He will not discharge a good workman for a slight offense and retain the poorest men. A good foreman (instead of giving his orders to a man verbally and imperfectly) will always carry a sketch block or pad in his pocket, and where drawings are not used, will give his orders upon paper, together with a rough pencil sketch, if required. He should then required the workmen to file away those orders, thus putting him in possession of the necessary evidence to defend himself in case there should be any fault with the work when completed.

A foreman should realize that his workmen are entitled to his respect, and he should conduct himself in such a manner that when he moves about among his men they will feel in duty bound to show him all the courtesy which pertains to his position. His personal habits should be such as may with profit be imitated by every man in the shop. If a workman gets into trouble over a piece of work, a kind and sympathetic foreman will always help such a person out of his difficulty.

It is wise for a foreman to use only the best language towards his men, for the use of profanity not only creates an enmity between the foreman and the workman, but also destroys the ambition and interest which the latter should always manifest in his work.

A foreman should be systematic, and wherever a standard or a certain routine can be applied to any branch of the work, it should be done. Tools, instead of being scattered over the floor, should each have a particular place. Thus, both the foreman and workmen are saved the aggravating annoyance of searching for those tools.

When a piece of work is given to a mechanic he should always be allowed to finish it, for one of the most disagreeable things and also one of the most humiliating to the workman is, to commence a piece of work and then have the foreman to take it to some one else to finish.

Finally, a model foreman should endeavor to make himself so useful to his employers that they cannot well do without him, taking the same interest in managing the shop, and studying economy with as much care as if his own capital were invested in the business. The manufacturing world are looking for artisans of this kind, and any person who has followed the opposite plan, will, by adopting the principles herewith outlined, be agreeably surprised in a short time that he can make progress with so much greater satisfaction to himself than ever before.

Missouri Millers' State Association.

The following circular has been issued:

OFFICE OF SECRETARY, 14 SOUTH MAIN ST.
ST. LOUIS, Mo., June 2, 1880.

The Missouri Millers' State Association will receive new members from this date until July 24, '80, on the following basis as an initiation fee, the same to be taxable thereafter with such assessments as shall be levied on all its members:

On burrs 36 inches diameter or over	$5 00 per pair
On burrs under 36 inches diameter	2 50 per pair
On rolls	1 70 per set

These assessments apply only on burrs operated on wheat, middlings or bran.

Membershtp in the State Association constitutes membership in the National Association without additional cost.

Every mill receiving this circular is cordially invited to take immediate advantage of the opportunity to become connected with the Association.

DAVID B. KIRK, Sec.

Engineering Structures and Wind Pressure.

The Tay Bridge inquiry has come to a close, and the Board of Commissioners have adjourned to digest the enormous mass of evidence submitted to them—a process which will probably take months of close application. It is not our purpose at the present time to give even a short *resume* of the conflicting statements, suggestions or theories offered, nor do we intend to point out the features which to us appear to be important factors in the causes leading to the destruction of the Tay Bridge. Such questions will, we believe, be more properly and profitably discussed when the decision reached by the Board of Trade has been made public. There is, however, one matter which merits attention at the present time, and should be regarded with especial care in this country, where recent events have again emphasized its importance. We refer to the subject of the effect of wind pressure upon engineering structures. Setting aside for the present the question whether the wind alone upset the Tay Bridge, or whether, as Sir Thomas Bouch and his friends still stoutly maintain, a derailment aggravated a danger not in itself serious, we wish to call attention to the astonishing divergnce of opinion held by meteorologist and engineers in regard to the force of the wind.

Sir George Airy, Astronomer Royal, testified that the maximum pressure recorded at Greenwich was 40 pounds per square foot, and he thought it likely that, had not the instrument given way, 50 pounds would have been reached. At limited times and over limited surfaces the pressure might range between 50 and 100 pounds in a valley like that of the Tay; but over such large surfaces as that presented by the fallen bridge, the pressure would be very much less. For the Firth Bridge he had estimated 10 pounds per square foot, but thought that in the case of a structure built and located like the Tay, the figure ought to be higher. Prof. Stokes and Robert H. Scott, of the Meteorological Office, took exception to this estimate, which they considered far too low. Mr. Stokes gave some interesting data relating to the manner of measuring the velocity and pressure of the wind. From his evidence it appears that at present scientists have succeeded only in attaining an approximation in calculations on the pressure of wind on plates. He stated that, hydrostatically measured, a pressure of one pound on the square foot gave a velocity of twenty miles, and that about 80 per cent must be added to what is called the standard pressure, deduced from the known velocity, in order to get the pressure per square foot. Mr. Scott gave testimony relating to the velocity of the wind near the time when the Tay Bridge fell, as recorded at the observatories at Aberdeen and Glasgow, the highest velocity observed at the time, for a period of a few minutes, being 120 miles per hour. An engineer, Mr. Benjamin Baker, approached this snbject in quite a different way. He stated that in his opinion the lateral pressure on the bridge did not exceed 15 pounds per foot, and in support of his statement gave the details of a series of practical tests made by him to ascertain the destructive force of the wind. He had noticed two signal boxes near the bridge which had windows on the windward side, and from experiments he had made with sash frames, he had reached the conclusion that it was idle talk of a pressure of 40 pounds, when structures unable to resist 9 pounds per square foot remained intact. He instanced a number of light buildings, etc., near the Tay Bridge which could not have stood more than 15 pounds per aquare foot; and pointed out the fact that, as French experiments had shown, rolling stock would be upset at 35 pounds.

It will be seen how wide the range of estimates by men of authority is on this subject even upon so apparently simple a question as the maximum pressure to be guarded against. From an engineering point of view, however, the problem is a far more difficult one. We do not know to what degree the size of the resisting surface modifies the observations made with small areas; we cannot tell in what manner the form of the latticework of our bridges and other articulated structures affects the problem; we are unable to assign any value to the pressure exerted upon surfaces partly projected by other bodies from the direct impingement of the wind. With bridges as now generally built, it is obviously unsafe to assume that a windward girder shields the one to leeward. From our present knowledge we cannot measure the forces that are brought to bear upon a bridge vibrating under the action of gusts of wind returning at more or less regular intervals.

Until these questions are answered to the satisfaction of engineers, nothing else is left them than to adopt the plans used at the St. Louis Bridge, of considering the latticed work equal to a close wall covering its whole surface. We are pleased to notice that during the recent convention at St. Louis, leading American engineers gave the subject all the prominence for which its importance calls. Our Signal Bureau. it appears, is about to take the matter up, and Gen. Myers, who conducts it so efficiently, has acted wisely in calling upon the civil engineers for assistance and co-operation. We feel confident that the gentlemen appointed to confer with him will devote all their energies to a matter which cannot be too thoroughly discussed. We suppose that the experimental portion of the inpuiry will rest with the Signal Officers, who are certain, by well-directed efforts, to contribute to our present meager stock of knowledge, important facts having a valuable practical bearing.

The Army Worm.

The army-worm, now devastating parts of Long Island and New Jersey, is so-called because it appears in scuh large numbers, and because, like others of its species, it moves in columns and follows a leader. It is a caterpillar, the larva of a moth, and noted for its voracity, as it well may be, since it can eat, it is said, more than double its own weight in twenty-four hours. Although less glutious, as a rule, it is more destructive than the locust, from its greater fecundity and wider distribution over the vegetable world. It feeds on leaves, flowers, roots, buds, seeds, and even the wood of plants—indeed, it is nearly omnivorous. The worm is asserted to march in regular and exact order; it lives in society, and moves in procession either in single file, or two, three, and four abreast, the line being so perfect in the columns that the head of one is never beyond the head of another in the row. It follows the leader, stopping when the leader stops, making journeys from plant to plant or from tree to tree, in quest of food, returning to its rest in the same order. The worms form ranks, march and halt with the precision of soldiers. When several nests are in the same neighborhood, the going forth and coming back of the creeping battalions at the same hour, commonly toward nightfall, is very curious and interesting. Caterpillars include more than 1,000 varieties, there being 700 in New England alone. They have all 13 segments; the first consisting of jaw and mouth; the second, third and fourth of the thorax of the future insect, and the other segments of the abdomen. Their rapid growth and extraordinary consumption are shown by the common silk-worm, which, according to Vincenzo Dandolo's treatise on silk, increases, during the 30 days necessary to its full growth, from 1 to 40 lines in length, and from 1-100th to about 95 grains in weight. In that time, therefore, it increases its weight 9,560 times, and eats 50,000 times its weight of food. In the Northern States there are about 1,000 kinds of butterfiies and moths. As each female lays from 200 to 500 eggs these species would produce, on an average, from each single female, 300,000 caterpillars a year. If one-half of these were females, the second generation would be 45,000,000, and the third 6,750,000,000. With such fertility, it is easy to see that the the destructive power of caterpillars, particularly the army-worm, must be prodigious.

American Enterprise in Russia.

Two or three weeks ago, a distinguished company of mining engineers and metallurgists, under the leadership of Mr. Wharton Barker, a leading banker, left New York in the Scythia, their ultimate destination being Southern Russia, and the object of their pilgrimage to start a great American project for the development of the resources of that country. The inside history of the expedition is interesting. The Russian Government, it appears, has long been anxious to open up and reap the benefits to be derived from the development of the great iron and coal fields known to exist in that portion of their territory which borders on the Sea of Azof. The satisfactory manner in which American enterprise had, under Winans and Harrison, created the railroad systems of Russia, and the knowledge also that the coal and iron industries have reached a high state of perfection in this country, were probably the inciting causes that induced Russian authorities to offer to confide this highly important work to American hands.

Mr. Wharton Barker, a well-known banker of Philadelphia, who acted as the agent of the Russian Government several years ago in the construction of several war vessels at the Philadelphia ship-yards, was selected as the proper person to whom a work of such importance could be confided; and accordingly we are informed that the Czar, on the occasion of a visit by Mr. Barker to Russia about a year ago, tendered to him a concession which includes the sole right of opening up the Donetz coal fields north of the Sea of Azof; the iron deposits of the Krivoi Rog, north of Crimea; the construction of a railway system for the proper development of the foregoing; the establishment of a great shipping port in the Sea of Azof; the erection of a Bessemer establishment; the bulilding of grain elevators, etc.

The time of this important concession is stated to extend to eighty years—certainly a a very liberal allowance. Mr. Barker at once laid the matter before some of the leading capitalists of New York and Pennsylvania, with the result of the sending out of a corps of engineers to make a thorough geological survey of the region. These experts were under the direction of Mr. Henry A. Vezin, and their report, lately made, was so satisfactory, that a number of the capitalists named agreed to furnish the capital necessary for the undertaking of the work, which is estimated to be not less ttan $8,000,000.

The expedition which has just set out under Mr, Barker's direction, comprises in its makeup, Mr. John Fritz, of the Bethlehem Iron Co.; Charles S. Hinchman, of the Pennsylvania Iron and Steel Co.; and S. T. Fuller, of the P. W. & B. Railroad Co. These gentlemen will inspect and report upon the character and quality of the coal and iron ores, the fitness of the country for railroad purposes, and other matters affecting the commercial aspects of the enterprise. Should their reports to the stockholders be satisfactory, the work will be at once undertaken and pushed forward.—*Manufacturer and Builder.*

MANUFACTURE OF PAPER BARRELS.—The American Paper Barrel Company, of Hartford, Conn., make barrels, kegs and cans from paper pulp, which is done wholly by pressure by screw or toggle-joint, or both combined. The barrel is made on a shape or form to make the inside, and outside of this is another to make the outside, the inner form being changed in sections to admit of its folding on itself for the removal of the barrel. The outer form contracts by the action of screws (self-operating) during the process of shaping the barrels. One machine is capable of producing 200 barrels per day. The heads of the barrels are produced by similar means, but on a much simpler machine. These are disks with a rim slightly projecting on one face. In some cases both heads are cememted in, and straightened by an iron hoop at each end. When removed from the machines, the barrels, kegs, heads, etc., are placed in a kiln or drying-room, where they remain from three to twenty-four hours, according to size and the degree of heat admitted to the room. The barrels are coated inside when required, by a resistant varnish, and are painted or varnished outside. They are adapted for flour, sugar, and any dry substances, for kerosene, lard, or any liquid, and kegs are made for powder, and cans for other materials. These vessels are said to be practically indestructible, cannot leak, are light, and easily handled.

DEATH OF A MEMBER OF THE ENGLISH MILLING PARTY.—Frederick Thompson, a wealthy miller, of Wakefield, England, who came to this country in May last to attend the Millers' Exhibition in Cincinnati, met his death in a strange manner at Fox Lake, Wis., July 2. He and a friend named Louis Feischer, of Liverpool, England, took a small boat to go out on the lake fishing. They had not gone far when Thompson dropped the oars and fell over the side of the boat. Feischer jumped after him, but Thompson, being a heavy man, sank immediately and pulled Feischer with him. Assistance quickly arrived, and Feischer was rescued and resuscitated with difficulty. Thompson's body was recovered. At the inquest the jury found that Thompson died of heart disease or apoplexy, and that probably he was dead when he struck the water. Mr. Thompson was a man of wealth, and was prominently identified with milling interests in the provinces of England and Ireland. He was to have sailed home on Saturday, and intended to return here in the fall and establish branches of his business in the United States. He leaves a wife and three grown children. His body is at Chicago, and will be enbalmed and forwarded to his friends.

Our Book Department.

For the convenience of our readers, we have made arrangements with publishess so that we can furnish any of the following works, postpaid, on receipt of price. All remittances must be made by post-office money order, draft on New York or Chicago, or by registered letter. For sums of less than $1, postage stamps will be taken. Address all orders to

E. HARRISON CAWKER,
Publisher United States Miller,
Milwaukee, Wis.

CRAIK—*The Practical American Millwright and Miller.* By DAVID CRAIK, Millwright. Illustrated by numerous wood engravings. and two folding plates. 8vo, $5.

CONTENTS.—Part I. Introduction—Chapter I. Mechanical Powers. The Lever, The Inclined Plane, The Wedge, The Screw, The Pulley and Cord, The Crank. II. Fly and Balance Wheels. Centrifugal Force and Circular Motion, Action and Reaction, Friction. III. Transmission and Transportation of Motive Power. IV. Peculiarities and Properties of Pressure of Water, Taking Levels, Fitting Down Sills Under Water, Pressure of Water, Velocity of Falling Water, Tables of Velocity of Water and Quantity Discharged, Measuring a Stream of Water, Table of the Quantity of Water Passing Over a Wier. Part II. Water Wheels. V. The Undershot. VI. The Overshot. VII. Experiments with Wheels, Barker's Wheel. VIII. Central Discharge Wheels. IX. Spiral Discharge Wheels, The Rose Wheel. X. Spiral Screw or Flood Wheels. XI. Mill-Dams. Part III.—Saw Mills. XII. The English Gate. XIII. The Mulley Saw. XIV. The Gang. XV. The Circular Saw-Mill, The Edging Circular, Table of Logs Reduced to Inch-board Measure. Part IV. Grist Mills. XVI. Planning, Gearing, Belt Gearing, Gearing Overshots, The Building, The Husk Timbers, etc., The Bridge Trees, The Step, The Spindle, The Bed-Stone, The Driver, The Damsil, The Boxes, The Bushes, The Curb, The Hopper, Shoes, Mill Stones, Burr Stones, Truing the Stones, Draught, Dressing the Stones, The Quarter Dress, The Sickle Dress, Balancing the Runner. Bolts, Bolt Chests, Bolt Cloth, Smut Machines, Screens, Merchant or Manufacturing Bolts. Part V.—XVII. The Oatmeal Mill, The Kiln, The Process of Drying, Dressing, and Hanging the Stones, Manufacture of Split Peas. XVIII. The Barley Mill. XIX. Wool Carding and Cloth Fulling and Dressing, The Tenter Bars, The Shearing Machine, The Cloth Press. XX. Windmills. XXI. Steam Power. Index.

HUGHES.—*American Miller and Millwright's Assistant.* By WM. CARTER HUGHES. A new edition. In one volume, 12mo. $1.50.

Among the Contents will be found the following: Introduction—Explanation of Technical Words. Part I. On the First Principles of Mechanics.—Table of the Surfaces of Contacts without Unguents—Tables of the Results of Experiments on Friction, with Unguents, by M. Morin—Table of Diameters of First Movers—Table of Diameters and Circumferences of Circles, Areas, and Side of Equal Squares—Geometrical Definitions of the Circle and its Parts—Centre of Percussion and Oscillation. Hydrostatics: Introduction—On the Upward and Downward Pressure of Water—Specific Gravity—Table of Specific Gravities—Hydrodynamic Power of Water-wheels—On the Action and Reaction of Water, as applied to Water-wheels—On the Construction of the Combination Reaction Water-wheel—Table of Velocities of Water-wheels per minute, with Heads of from four to thirty feet—Table of the Number of Inches of Water Necessary to Drive one Run of Stone for Grist or Sawmills on Heads of four to thirty feet—Table showing the Required Length of Overshot and Breast.wheels on Heads of ten to thirty feet—Table showing the Velocity of Water. Part II.—Practical Milling and Millwrighting.

PALLETT.—*The Miller's, Millwright's and Engineer's Guide.* By HENRY PALLETT. Illustrated. In one vol. 12mo., $3.

LEFFEL.—*The Construction of Mill-Dams*: Comprising also the building of Race and Reservoir Embankments and Head Gates, the measurement of streams, gauging of water supply, etc. By JAMES LEFFEL & Co. Illustrated by 58 engravings. 1 vol. 8vo., $2.50.

LARDNER.—*The Steam Engine:* For the use of Beginners. By Dr. LARDNER. Illustrated. 12mo, 75 cents.

TEMPLETON.—*The Practical Examinator on Steam and the Steam Engine:* With Instructive References relative thereto, arranged for the use of Engineers, Students, and others. By WM. TEMPLETON, Engineer. 12mo, $1.25.

BOURNE.—*Recent Improvements in the Steam Engine:* In its various applications to Mines, Mills, Steam Navigation, Railways, and Agriculture. Being a supplement to the "Catechism of the Steam Engine." By JOHN BOURNE, C. E. New Edition. With numerous Illnstrations. 16mo. Cloth, $1.50.

BYRNE.—*Handbook for the Artisan, Mechanic and Engineer:* Comprising the Grinding and Sharpening of Cutting Tools, Abrasive Processes, Lapidary Work, Gem and Glass Engraving, Varnishing and Lacquering, Apparatus, Moterials and Processes for Grinding and Polishing, etc. By OLIVER BYRNE. Illustrated by 185 wood engravings. One vol. 8vo., $5.

EDWARDS.—*A Catechism of the Marine Steam Engine,* For the use of Engineers, Firemen and Mechanics. A Practical Work for Practical Men. By EMORY EDWARDS, Mechanical Engineer. Illustrated by 60 engravings, including examples of the most modern Engines. In one volume, 12mo, $2.

WATSON.—*The Modern Practice of American Machinists and Engineers:* Including the Construction, Application and Use of Drills, Lathe Tools, Cutters for Boring Cylinders and Hollow Work Generally, with the most Economical Speed for the same; the Results Verified by Actual Practice at the Lathe, the Vice, and on the Floor, together with Workshop Management, Economy of Manufacture, the Steam Engine, Boilers, Gears, Belting, etc., etc. By EGBERT P. WATSON, late of the "Scientific American." Illustrated by 86 engravings. In one volume, 12mo, $2.50.

LUKIN.—*The Young Mechanic.* Practical carpentry, containing directions for the use of all kinds of tools, and for construction of steam engines and mechanical models, including the art of turning in wood and metal. By JOHN LUKIN, author of "The Lathe and Its Uses," etc. Illustrated. 12mo, $1.75.

LUKIN.—*Amongst Machines:* Embracing descriptions of the various mechanical appliances used in the manufacture of wood, metal, and other substances. 12mo, $1.75.

LUKIN.—*The Boy Engineers:* What They Did, and How They Did It. With 30 plates. 12mo, $1.75.

WILSON.—*A Treatise on Steam Boilers:* Their Strength, Construction and Economical Working. By ROBERT WILSON. Illustrated. 12mo, $2.50.

CONTENTS.—Chapter I Introductory. II. Strength of Cylinder, Sphere and Flat Surfaces. III. Properties and Character of Boiler Materials. IV. Riveting. V. Welding. VI. Construction of Boilers. VII. Boiler Mountings and Setting. VIII. Incrustation. IX. Wear and Tear. X. Factor of Safety. XI. Testing. XII. Boiler Explosions. XIII. Combustion of Coal. XIV. Smoke Prevention and Firing. XV. Heating Surface. XVI. Boiler Power. XVII. Bursting and Collapsing Pressures of Cylinders.

ROBINSON.—*Explosions of Steam Boilers:* How they are Caused, and How They May be Prevented. By J. R. ROBINSON, Steam Engineer. 12mo, $1.25.

CONTENTS.—Explosions Caused by Low Water, by Over-Pressure, by Defects in Materials, etc.; by Scale or Sediment, by Repulsion of the Water; by Overheating of the water; How Explosions Caused by Low Water, by Over-pressure, by Defective Materials, etc.; by Scale and Sediment, by Repulsion of the Water, by Overheating of the Water, May be Prevented.

NYSTROM.—*A New Treatise on Elements of Mechanics:* Establishing Strict Precision in the Meaning of Dynamical Terms: accompanied with an Appendix on Duodenal Arithmetic and Metrology. By JOHN W. NYSTROM, C. E. Illustrated, 8vo, $4.

MOLESWORTH.—*Pocket-Book of Useful Formulæ and Memoranda for Civil and Mechanical Engineers.* By GUILFORD L. MOLESWORTH, Member of the Institution of Civil Engineers, Chief Resident Engineer of the Ceylon Railway. Second American, from the Tenth London Edition. In one volume, full-bound in pocket-book form, $2.

ROPP'S COMMERCIAL CALCUCATOR: Containing many convenient and valuable Tables, showing the value of Wheat, Corn, Rye, Oats, Barley, Cattle, Hogs, Hay, Coal, Lumber, Merchandise; the simple and compound interest at 6, 7, 8 and 10 per cent.; Measurement of Boards, Scantlings, Timber, Saw Logs, Cisterns, Tanks, Granaries, Corn-Cribs, Wagon-Beds, Time Table, Wages Table, etc., etc., etc.; also entirely New and Practical Method of Rapid Calculation. By CHRISTIAN ROPP, Jr. Pocket-book form, cloth, $1.

MCLEAN.—*The Miller's Text-Book.* By JAMES MCLEAN, of Glasgow, Scotland. Price, postpaid, 60 cents.

Any other books, either domestic or foreign, that our readers may desire, we shall be pleased to obtain and furnish to them at the lowest rates, postpaid, to any part of the United States or Canada.

Milling Poetry.

[*Stolen from the St Louis Miller.*]

THE MILLERS' EXHIBITION.

Now the jolly millers meet
In friendly strife and kindly greet,
With sample bag of fancy name—
A fortune to some, to others fame.
The beauteous flower that decks the vale,
The grand magnolia that scents the gale,
The rose, the lily, and daisy bright
Are millers' emblems for pure and white;
And, O, such a glorious sight to see
Men striving for greatest purity
In staff of life, man's greatest need
Extracted from a little seed.
Grand Exhibition and matchless hall
With rustic grotto and waterfall
And quaint old mill and water wheel
Our fathers used for flour and meal,
All hail! I wish you naught but weal!
And now the ponderous engines move
The Godlike power of man to prove,
Water and fire combine in steam
Now supersede the running stream;
The process new and purifiers
And what machines the mill requires,
Are here collected for public view—
All that is valuable and new.
To men like Blain and Gault and Kirk
Who no responsibility shirk,
The praise belongs; all will confess
This Exhibition a grand success—
To Cincinnati's generous heart
The jolly millers their thanks impart.

COLUMBIA'S Millers.

Columbia's millers hoped to see
And fraternize right gladly
With our accociation's chief,
The hearty, genial Hadly.

Of fellowship the *dexter* hand
Bain was prepared to give him,
And ask that the convention should
With "three times three" receive him

But "best laid schemes" are often doomed
To lapse in non-completion,
As buds that promise well in spring
Ne'er reach to their fruition.

And circumstance, by edict stern,
Decreed those hopes we cherished
Should share the fate of other hopes
That promised well, but perished.

OUR MILLING PILGRIMS.

From Albion and Erin's Isles
A band of "brothers dusty"
Have crossed the sea, their minds to free
Erom notions old and musty.

Their old style modes of making flour
Make nothing now but losses,
And o'er the Atlantic they have steamed
To master the "New Process."

In bygone days the millstones' boom
Was music to the miller,
And while they filled his coat with dust,
They fill'd his purse with siller.

When true in face and balanced well,
And free from vice of winding,
And "dress'd" and "crack'd" and work'd with skill,
They did the best of grinding.

But grinding now is obselete,
Doom'd to extermination;
Its substitute, in "high-school" mills
And terms, being "granulation."

In Cincinnati's Hall of Power,
Machines in countless number
Will show that ours, for making flour,
Are little else than lumber.

We hop'd that iron and pore'lain rolls,
Might save us from destruction,
But these are now effete compared
With "gradual reduction."

Heaven grant our pilgrims to the West
A safe and sound returning!
With milling light in every breast
To turn to joy our mourning.

And Er'n and Albion's merry mills
Secure from competition,
And honest millers' profits 'scape
Columbian "attrition."

A Lofty Elevator.

The highest elevator in the world has just been completed in the Washington monument, and the first trial of its working was made on the 19th of July. It is 176 feet high, is capable of bearing ten tons, and was erected at a cost of $20,000. It is run by an 80 horse power engine, and will be used in carrying the stones to the top of the shaft. A railroad constructed from the workshop runs to the foot of the monument, where a derick hoists the stone and places it on the elevator. At the top four railroads on either side convey the stones to their places. An iron stairway has also been put in at a cost of $16,000. Both the stairway and elevator will be permanent. As the work proceeds sections will be added to the elevator. This will occasion a delay of two weeks, as each section of twenty feet is placed in position. The present height of the elevator which is twenty feet higher than the shaft, will be all that is expected to be built this year. The cable which supports the elevator has been tested, and will sustain 158,000 pounds. Workmen are now removing from the top of the monument three layers of stone, which is equal to six feet in height, which was found to be necessary, as it had scaled and is in other ways unfit for use. On the top of the monument are a number of men engaged in removing the immense stones which form the top layings. The largest stone blocks are raised by derricks and placed upon a small truck riding upon rails, which is then run upon the elevator. It is then lowered, there being a track at the bottom upon which the truck is rolled out upon a terrace. From this point the stones are let down about twenty feet by a derrick to terra firma. Mr. McLaughlin, superintendent, has a force of one hundred and twenty-five men employed at the work, and expects to commence laying the first stone about the 1st of August.

The elevator, engine, and everything of the sort, which are now below the level of the terrace, but covered by a frame building, will be covered over, so as to make the track level when the work is completed, thus keeping the motive power of the elevator entirely out of sight. When work on the monument is commenced in earnest, it is expected that a course of two feet will be laid every three days. To cut and trim the stone necessary for a course takes the work of twenty men for a week. The monument, it is expected, should Congress give the necessary appropriations, will be finally completed in 1885. The foundation has been strengthened so as to bear all the additional weight that may be necessary to its completion. It now has a foundation of 37 feet, 13½ feet deeper than the old one. This foundation is composed of a composition of English Portland cement and crushed stone, and is considered much better than masonry. Thirteen thousand barrels of cement were used in the foundation alone, which has cost $92,000. The monument is to be five hundred and fifty feet high, of which height one hundred and fifty-two feet has already been attained. The present weight. including the foundation, is estimated at forty thousand tons. At the base the walls are fifteen feet thick, losing a batter of one-eighth inch, to use a technical phrase, at every foot, or, in other words, the walls ore one fourth inch narrower for every foot attained at the summit. The walls are now twelve feet in thickness. As the monument stands at present, upward of $300,000 has been expended on its erection. Work on the monument has begun in earnest.

Biscuit making.

Biscuit making has become one of the most important branches of alimentary industry, and the following description of the establishment of Messrs. Drew & Sons, at Shadwell, London, will be read with interest by many of our readers. The works, says a contributor to a daily contemporary, the *Morning Advertiser*, are in four storeys, and are conveniently arranged with regard to the routine of work, and suggesting in their entirety an immense subdivision of duties and processes, and a corresponding degree of organisation in the *personnel* of the establishment. Following the order of manufacture are, first of all, the store-rooms, in which the materials employed are kept, or temporarily received, and undergo any previous preparation they may require. Three varieties of English flour are used, obtained mostly from the Eastern Counties, and Venetian, or Viennese flour, a "stronger" sort, which is largely used in the manufacture of wine-biscuits of various kinds, is also kept in stock. Sugar is another article of which there is a large consumption here, and it is kept in stock in several varieties, white and brown. In another room we find a goodly stock of eggs, imported from Honfleur. Butter, of which four sorts are used, lard, and other important ingredients, are kept here in large quantities; and there is besides an ample store of minor goods, such as nutmegs and other spices, currants, sultanas, orange, lemon, and citron peel, jams, "wafer-paper," for preventing goods from burning, and a large number of other articles necessary for the various details of manufacture. On the same floor is a steam-mill for grinding the white lump sugar. The mill is driven by an endless band from the shafting, and the sugar is rapidly reduced to the form of a fine powder. There is a large room, also, in which duplicates of the principal working parts of the several machines are kept in stock; so that on the failure of any one of them it may be immediately replaced without involving a stoppage. Next to this store-room is the engineer's room, a spacious and well-appointed "shop," supplied with a first-rate steam slide-rest lathe, and an abundance of tools of every kind, by which necessary repairs may be effected without delay.

The "mixing-room" is situated at the top of the building, immediately below the roof. The floor is of wood, kept scrupulously clean, and the walls are lined with white glazed tiles to the spring of the roof. The room has a ceiling, and beneath the ceiling is stretched a strong white cloth, so that every precaution is taken by which perfect cleanliness can be ensured. In this room the dough undergoes a preliminary kneading, which is effected by means of an apparatus called a "mixer," of which there are two. The kneader is simply a large hopper made of galvanized iron, the upper portion of which is expanded in the form of a tray, to which a temporary bottom is given by means of a hinged plate, which can completely close the mouth of the hopper, and be held securely in that position. The tray being nearly filled with flour, of which it would hold about a quarter or a third of a sack, the lard, milk, and other necessary ingredients are added. These are partially incorporated into a mass, after which the hand never again touches it, and then the catch of the plate is drawn, and the rough dough falls down the hopper, from which it is received on an iron table in the room below, to pass, next, into the "break." This is a machine strongly bolted to the floor beneath, which consists principally of a large iron cylinder placed horizontally and containing within it four horizontal shafts, each of which carries several arms, or cutters, so arranged that when the whole system is made to revolve, they all move free of, but yet near to each other. By these arms the mass of rough dough is continually divided, turned over again and again, re-compounded, and again broken up. As this process goes on, a trifle of carbonate of soda is added by the attendant at the mixer above, and then the remainder of the sack is thrown down gradually. The powerful machinery reduces the mass into a more uniform state, until, when its action has been continued for about 20 minutes, it is ready to be passed on to the next machine. When this state has been reached, the side of the cylinder is opened, and the charge delivered upon an iron slab. From this it passes between a pair of polished steel rollers in the next machine, set at first rather wide apart. When the whole mass has passed through to the other end of the slab, the direction of motion of the rollers is reversed, and the gauge is set a little finer. This process is repeated many times, until the paste has assumed a beautiful smoothness, and an almost perfect uniformity of structure. It is then cut into lengths, which are piled on each other, and the whole again passed through. The action of this machine is extremely beautiful. The thick, coarse, and comparatively unsightly mass, is gradually extended into a sheet of uniform thickness, which constantly diminishes at every turn of the machine, until the dough comes out perfectly uniform in colour, consistency, and gauge. These and nearly all the other machines on the premisses have been constructed by Messrs. T. & T. Vicars, of Liverpool, whose system has been also adopted by Messrs. Huntley and Palmer, Messrs. Peek and Frean, and other large biscuit bakers. In the complete uniformity they give to the sheet of paste from which the biscuit is finally prepared, lies the great secret of the excellence of the article produced. If the flour be not equally kneaded or mixed with the water and other additions to it, some portions of the biscuit will be moister than others, and will therefore want more baking than those which are drier, and it may even happen that the latter may be burnt, or dried up before the others are baked. Hard or flinty biscuits are the result of this defect; and very similar damage will result from a want of uniformity of thickness, a smaller thickness requiring less baking than a greater one. Having the perfect uniformity of kneading and structure which we have described, the paste is nearly ready for the cutting-machine, by which the sheet is divided and impressed with the pattern or lettering which the finished article is to have. There are several machines by which this work is performed, according to the class of goods. Taking the most complex of these machines as an example, we may notice the making of the biscuit named "Marie," a biscuit of comparatively recent introduction, but whose perfect shape, style, and flavour have given it a rapidly-increasing popularity as a wine-biscuit. In this machine several movements are combined, and the work proceeds automatically. The paste is finally gauged by a pair of rollers, and moves on a cloth "feed" over a roller which presses it against a metal box containing the cutters, and, within the cutters, the plate engraved with the lettering or pattern. These cutters devide the paste completely, while the stamps only print it. As the motion continues, the "scrap" or paste left between the buscuits as they are coined, is kept back, to be afterwards worked up anew and passed through the machines, and the biscuits are finally laid in symetrical order on iron-wire trays ready for the oven. In the making of "Brightons," what is called soft dough is used, and its use necessitates the employment of a special machine, in which the rollers are covered with soft flannel, as the paste would stick to the polished surface of the steel rollers. For the numerous cases in which egg has to be used, the eggs, previously broken in the manner described, are beaten up in a small machine driven by steam, which makes a capital "whisk." This is Griffiths' patent.

The baking proper, a very delicate and all-important part of the process, is carried on automatically, and with the greatest nicety. The principal kinds of oven are used, the plate-oven, the chain-oven, and the compound-oven, all constructed on the principal of submitting the biscuit to equal quantities of heat, and all capable of baking any of the articles produced in the manufacture, but one form being generally preferable to any for a specific describtion of goods. Thus the plate-oven is mostly used for the arrowroot, or penny biscuits, which is the greatest staple of this manufacture. In it the goods are laid on iron plates, which are equally exposed to the heat by the continuous motion given to them. The chain-oven, in which other describtions of goods are baked, is an admirable invention, which does its work to perfection. It is, like the others, a chamber upwards of 40 ft. in length, and several ft. in height, which is heated to the temperature requisite for baking. Several light drums, or frames mounted on horizontal axles, and laid transversely to the length of the chamber, are made to revolve on their bearings and they give a continuous motion to four chains laid across them at suitable distances for supporting the trays, laid two abreast of each other, on which the biscuits previously cut and stamped are laid out ready for baking. The trays are laid on the chains in succession at one end of the oven, and move with a slow progressive motion towards the other end. The rate of motion is regulated in such a way as to communicate to the biscuit exactly the right amount of heat. This is adjusted by means of a pair of cones, the relative position of which is affected by variations of the temperature, in such a way as to prolong the time of passing through the oven if the heat should fall, and to shorten it if the heat should rise. As the furnaces themselves are also self-feeding and self-stoking, with a view to the production of a heat continuously uniform, the action of these ovens is sensibly equable, and the goods, having at every stage of the process been treated with perfect uniformity, themselves neoessarily exhibit a corresponding uniformity. In size, form, tint and fragrance each article is a *fac-simile* of others of its class, and the great object of the mauufacturer is thoroughly attained. The important practical advantage of the chain-oven is that it enables the heat to reach the goods directly, a result in itself highly favorable to uniformity of character in the product. The compound-oven has been in use here since July last with excellent results, and is so called fron combining with the oven itself the machine employed in the process which immediately precedes the baking, and it is fed, by a continuous action of the machine, with the buscuit just before cut out and stamped.

The baking having been completed, the trays on which the goods have been baked are deposited on a "Jacob's Ladder," which carries them to the packing floor. The "Jacob's Ladder" is an apparatus consisting of two endless chains, formed of long, straight links jointed together, and passing above and below round two octogonal frames, which are kept in almost continual motion. Each link carries a point of support for a shelf, which, as it comes up to the level of the table on which the trays taken out of the oven are placed, is immediately loaded with one. The succeeding ones go up similarly loaded, and the empty ones are made to bring down the trays when done with them. The tins used for packing are made on the premises, and those returned are washed in strong pickle, labelled, and repapered for the reception of fresh goods. When thus ready to be sent out, they are removed to the forwarding room, whence they are sent off to the agents of the firm at Liverpool, Brighton and Dartford, for the supply of the country trade, or are despatched in the numerous vans of the firm, which daily visit every portion of the metropolitan district. In connection with this point it may be remarked that the premises include stabling for 70 horses, and that steam machinery enters largely into the equine economy of the establishment; the chaff is cut the oats bruised, and the horses groomed by it. A horizontal engine drives all the machinery on the premises, which comprises several sets of the various machines we have noticed, which are not nearly all, however, that are used here. A lift works through the entire height of the building, upwards of 70 feet.—*The Miller, London.*

The Recent Milling Exhibition.

For the twelve months to July 1 our exports of wheat from sixteen principal ports were 149,139,293 bushels, and our exports of wheat flour for the same period were 5,787,967 barrels—an increase of 40,045,758 bushels wheat and 437,358 barrels of flour as compared with our exports from the same ports for the year ending July 1, 1879. The value of these exports for the last year was $218,954,354, against $155,540 633 for the year preceding, the increase in value of the exports of flour alone being $5,913.863. The total exports of wheat flour from the United States for the year ending July 1, 1879, were 5,529,417 barrels, and of wheat 122,353,936 bushels, Great Britain and Ireland alone taking 2,629,665 barrels of flour, and next in order coming respectively, Brazil, British West Indies, British Possessions in North America, Hayti and San Domingo,and Cuba, while France and Germany took but 27,075 and 11,233 barrels respectively.

Probably the question which came with most force to the minds of all American millers who attended the International Exhibition lately held at Cincinnati was this: Can we, and if so by what means, considerably and permanently increase our exports of manufactured flour, instead of sending abroad so much wheat to be ground by foreign millers? While those present from abroad, who examined the wonderful display there made of American improved milling machinery, were undoubtedly at the same time revolving in their minds the possibilities of this question being answered in the affirmative. As for the trade with countries which have not been accustomed to making their own flour there can be little doubt that it is quite within the ability of our millers to complete successfully, but when we already make such considerable shipments, and more than half of our exports of manufactured flour, to Great Britain and her West Indian dependencies , there is evidently good ground for hope that we may yet materially extend this trade in all countries where there is a demand for American wheat. Looking at the matter in this light, the late Millers' Exposition had a national significance, as, in showing the advancement our mechanics had made in this branch of industry, it indicated the possibility of a still larger field for labor here, to the profitably employed in competition with European cheap labor only because of the improved machinery our millers have introduced.

To mention in detail all of the different kinds of machinery and appliances for milling and in its collateral branches shown at Cincinnati would fill a large proportion of this paper. Commencing with a large variety of turbine wheels and many improved patterns of engines, with all the appurtenances of shafting, gearing, etc., which belong to all manufacturing establishments where power is employed, the display comprised nearly everything used in the milling business in this country, together with much that is thought best of the machinery used in England, Germany, Austria, Switzerland and France. There were many kinds of gradual reduction mills; smooth and corrugated roller mills in great variety; bolts, bolting cloth, and reels of widely differing patterns; scouring, cleaning, brushing, and heating machines; hand and power millstone dressers of many kinds; electric and other purifiers, etc.; and nearly all of the mochinery was shown at work, the flour made affording samples from which bread was baked in one of the departments of the Exhibition. For the best flour made on the grounds the award went to an Indiana firm, but the most important exhibits of flour and grain were from the States of Ohio, Illinois, Iowa, Kansas and Missouri, although great interest was shown in an exhibit of Hungarian flour, which, though excellent in quality, was thought to be decidedly inferior to many of the samples shown by our millers. A gold medal which has been offered for the greatest improvement in the last ten years was awarded to a Michigan firm for the middlings purifier; a premium for the best mixing and sifting machine went to Prussia, and for the best bolting cloth to Switzerland, while a Budapest firm in Hungary received an award for the best roller mill.

In short, the Exhibition presented a comprehensive epitome of about all that is now being done in the milling business, either at home or abroad, and, as the trade is now in a sort of transition state—the minds of millers being divided on questions of high or low grinding, gradual reduction, and new process methods—it cannot fail to have had a most decided influence, which will make itself apparent in the future of the business in this country. German and Austrian mechanics have during tho past few years, rather taken the lead of England in improvements in milling machinery, but there is nowhere else so great a variety of excellent appliances for the business, some of which are of acknowledged superiority, as American inventors and mechanics have brought forward and perfected for the use of our millers. It is this fact alone which accounts for the past increase in our exports of flour, and gives promise of our being able in the future to export the products of our wheat fields in the shape of flour to a much larger extent than we have hitherto done.—*Scientific American.*

The Keeley Motor in China.

It must be confessed that the resources of Mr. Keeley's genius are unlimited. After having exhausted the patience of his friends and the confidence of the stockholders who furnished the money to put his pretended great mechanical invention in operation, and lost his last trace of reputation as an inventor in this part of the world, it turns up in China, and he succeeds, by the intervention of a Chinese sub-prefect, named Tung Yu-ch'i (who no doubt is his agent), to bring his invention before the Emperor, using such persuasive influences as to accomplish a feat thus far only accomplished in the United States with credulous capitalists. The feat, namely, of causing the conservative son of the sun and moon who rules the Celestials to abandon the traditional indifference as to new inventions, not alone, but to promote the Keeley motor principle by Imperial decree, published in the official *Gazette* of Pekin, and of which we give here the translation:

"AN IMPERIAL DECREE.—The Censorate has memorialized us to the effect that Tung Yu-ch'i, an expectant sub-perfect in the province of Anhwui, proposes to contruct a steamboat to be impelled by a cold vapor generated without the use of fire, which shall supplant the one using fire. Its construction is already well-nigh completed, and it is estimated that 3,000 taels will suffice to finish it. A diagram, with illustrations of the invention, has been presented to the memorialists for their inspection. Should the steamer invented by the officer in question be found capable of quick motion and adapted to practical use, it will of course be proper to adopt it. We therefore command Shen Pao-Chen to device means for providing the 3,000 taels required to carry the invention into execution. He is further commanded, in conjunction with Li Hungchang and Ting Jih-ch'ang, to examine the diagram and the illustrations and to give the matter his most careful consideration. As soon as the invention has been completed it will be the duty of Shen Pao-Chen and the high officials associated with him to put it to the test of an experiment, and to report in a memorial to us whether it is found to be adapted to practical uses."

It appears that Mr. Keeley's Chinese agent, Mr. Tung-Yu-ch'i, is possessed of the same perseverance as his master, and has already gone through the same mill of adversity. It is reported that last year he called upon the Governor-General at Nankin, and represented that he had invented a machine which would go of its own accord and generate sufficient power to propel a steamer of the largest size. He succeeded in enlisting the sympathies of the Governor-General, and he was furnished with a credit of 3,000 taels, to be expended in Shanghai in the construction of a working model of the new motor. He appeared here with plans and specifications of the most mysterious nature, in which cogged wheels, tubes, and other contrivances were inextricably jumbled together. After hanging about the native and foreign workshops some time he produced a machine which would not work, and his visit to Shanghai was unprofitable. He was subsequently thrown overboard by Shen Pao-Chen, his patron. The same persuasive influences, however, which he brought to bear on the Governor-General he seems to have carried with him to Pekin, and to judge by the Imperial edict, which we have given above, he has used it successfully with the court and the Censorate.

The fact that there is still an office kept in New York city for the Kelley motor, does not affect our unfavorable opinion expressed above; its purpose being by no means to assist Mr. Keeley in his invention, but it is simply an enterprise for speculation in Keeley motor stock—in fact, a stock gambling den.

The Harris Corlis condensing engine entered at the Millers' International Exposition, Cincinnati, O., by Wm. A. Harris, its builder, of Providence, R. I., for exhibition and competition, has been sold, since the exhibition closed to P. A. & S. Small, York, Pa.

A Few Celebrated Bells.

China has been celebrated for her bells, but the Chinese bells have all the old saucer form. In the seventeenth century four great bells were cast and erected in Nankin, the largest of which weighed, it is said, not less than 50,000 pounds, and was 12 feet in diameter at its base. The weight of the bells brought down the tower in which they were hung. At Pekin there were seven bells of enormous dimensions; one of these is described by Magaillans as weighing not less than 120,000 pounds, having a height of 12½ feet, a diameter of 13½, and a circumference of 42 feet. They were used for denoting the five watches of the night, but we learn from the author of "China and the Chinese," that they are now out of repair.

Russia, among the countries of Europe, is the one most celebrated as possessing enormous bells; at Moscow in particular there are bells of most enormous size. The largest of them has been described by Dr. Clarke as a mountain of metal, and is termed by the Russians the "Tsar Kolokol," or King of Bells; it is the largest in the world, and is said to weigh 443,772 pounds. The height of this bell is 31 feet 4½ inches, its circumference 10 feet above the extremity of the lip is 67 feet 4 inches, its diameter is 22 feet 5½ inches, and its greatest thickness 22 inches. It is said to have been given to the Russians by the Empress Anne, and its value in money, merely as old metal, is estimated at $350,000—an immense sum to lie uncirculated and wasted, for the bell has never struck a note. This monstrous mass of metal was for nearly two centuries allowed to be partially buried in the sand of the pit in which it was molded—an object of wonder to the traveller and of the deepest reverence to the natives, who visited it with pride at festivals, and were extremely jealous of its being touched or measured by strangers.

The tones of the bells of Russia are very fine; that in the tower of St. Juan's church is said to produce, when sounded, a tremulous effect which is felt all over the city.

In the scramble which took place at the Reformation, the bells of the monasteries formed rich spoils for the spoilers. "They were gambled for," says Blunt, "or sold into Russia and other countries, and many of them were lost in their sea voyages, and remain to this day among the spoils of the ocean." In confirmation of this assertion, we may mention a fact given by stow in his "Survey of London." In the ward of Farringdon without, says the chronicler, was a cloister in which hung four bells, called Jesus bells, which Henry VIII. took down because he lost them in a game of dice with Sir Miles Palridge, who wagered £100 against them with his majesty.

The following are the reported weights of some of the most celebrated bells of the world:

	Tons.	Cwt.	Qrs.	Lbs.
The great bell at Moscow	198	2	1	0
A bell in the tower of St. Juan's Church, cast in 1819	80	0	0	0
Another in the same church	57	1	1	16
Another in the same church	17	16	0	0
The great bell at Pekin	53	11	1	20
One at Nankin	22	6	1	20
One at Olmutz	17	18	0	0
One at Vienna, dated 1711	17	14	0	0
One at Paris, placed in the cathedral in 1680, 25 feet in diameter	17	0	0	0
One at Erfurt, in Germany, considered to be the finest bell-metal extant	13	15	0	0
The great bell at Montreal	13	10	0	0
Great Peter, at York Minster, cost £2,000, erected in 1845	10	15	0	0
Great Tom, at Oxford	7	11	3	4
Great bell at St' Paul, weighed originally 3 tons, 13 cwt., 3 qrs., 1 lb.	5	2	1	22
Great Tom, at Lincoln	5	8	0	0
Dunstan, at Canterbury	3	10	0	0
Another at Montreal	7	6	0	0

The two bells of Montreal were cast by the Messrs. Means, who also cast the Great Peter, of York; the Great Tom, of Lincoln; the Dustan, at Canterbury; and the peel of bells in the tower of the Royal Exchange, London. These last bells have lately been recast, in consequence of the works of the clock, built by Mr. Dent, not being sufficiently powerful to move the chiming apparatus in a proper manner.

A Nevada Hercules—The Strongest Man in the World.

At Reno, in Nevada, according to one of Mr R. A. Proctor's letters to an English journal, there now lives a man who is probably the strongest in the world. His name is Angelo Cardela. He is an Italian, age thirty-eight years, five feet ten inches in height, and weighing 190 pounds. He is a laborer of temperate habits, but not objecting to the moderate use of malt liquors and light wines. In personal appearance he is not remarkable, but merely a good natured looking son of Italy, with a broad heavy face, a noble development of chest and shoulders, and large fleshy hands. His strength was born with him, for he has had no athletic training. This strength does not reside in his hair by any means, but apparently as much in his bones as in his muscles. At any rate, he differ from other men chiefly in his osseous structure. Though he is not of unusual size, his spinal column is double the ordinary width, and his other bones and joints are made on a similarly large and generous scale. He has been known to lift a man of 200 pounds weight with the middle finger of his right hand. The thing was done as follows: The man to be lifted stood with feet on the floor and arms outstretched, his hands being tightly grasped by two friends, one on each side, to preserve the balance of the body. "The slight assistance," we are assured, "had no tendency to raise the body, being merely to keep him from toppling over." Cardela then stooped down and placed the third finger of his right hand under the hollow of the man's foot, on which he was balancing, and with scarcely any perceptible effort raised him to the height of four feet, and desposited him standing on a table near at hand. It is said that two powerful Irishmen, living near Verdi, in Washoe county, Nevada, waylaid Cardela with the intent to thrash him; but he seized one in each hand, and beat them together till life was nearly hammered out of them. He is, however, of a quiet and peaceful disposition. His strength seems to have been inherited, for he states that his father was even more powerful than he is himself.

Fictitious Flour Brands.

Chicago *Journal of Commerce:* It is by no means an exaggerated statement to say that fully three-fourths of all the flour manufactured in this country is sent out under fictitious brands. The commission merchants who handle large amounts of flour in every prominent commercial center in the country, are largely responsible for this gross imposition on the public, and still worse injustice to the manufacturers. No commission house in this or any other prominent city, where hundreds of thousands of barrels of flour are handled and sold every year, is without its scraping tools and stencil brands, which are put to a constant and vigorous use in erasing and rebranding the flour which comes into their actual possession, or merely passes through their hands.

It is a steady scrape and rebrand all the time, for which purpose experts in business are employed by many firms. For instance, a mill in some obscure part of the country has the reputation for making a very good quality of spring or winter wheat flour, but is not so well known as some of the larger and old established mills whose flour sells anywhere readily on its reputation and brand. It is an easy thing for the flour scraper to erase the brand from the barrel head of this flour, and substitute in its place that of another and well known brand, for by so doing he not only effects its sale quicker but obtains for it a better price.

It is well enough to say that some of the States have laws to prevent such dishonest practices as this, and to punish those who practice them; but the laws in this regard are practically a dead letter on our statute books, for the offense is repeated every day in the week, and whoever hears of an arrest being made, or punishment imposed, for this species of fraudulent imposition? The practice is an open one, and some of our manufacturers of standard brands of flour are the sufferers thereby, while the consumers, in nine cases cases out of ten, are not able to detect the imposition.

In view, therefore, of the extent to which this imposition is carried, we are glad to learn that in the Millers' Convention, the Committee on Brands and Trade-marks have recommended that a committee be appointed to urge upon Congress the passing of a law prohibiting millers sending out flour except with the name and location of the miller, and where the flour is manufactured, stamped upon the barrels and sacks. We could only desire that the committee would have included in their recommendation the other parties, to whom we have referred; for the millers are not the men who are the most guilty of this very disreputable practice.

The law should be so worded as to compel every manufacturer or firm to burn in their names and location on the head of every barrel they send out, put on in some form not easily erased. The millers who themselves counterfeit other brands than those not strictly their own, deserve but little sympathy when they in turn are imposed upon.

About a dozen millwrights who have been employed on the Freeman mill at La Crosse, Wis., have gone to Winnebago, Minn., to work on C, L. Coleman's mill.

NEWS.

EVERYBODY READS THIS.

ITEMS GATHERED FROM CORRESPONDENTS, TELEGRAMS AND EXCHANGES.

Milton & Co., of Medina, N. Y. are repairing their mill.

Tanner's grist mill, at Russelville, N. Y., was recently burned.

The new mill at Watertown, Minn., is rapidly approaching completion.

The new mill at Cologne, Minn., is inclosed and the machinery is being put in.

The spur road to the Florence Mills at Stillwater, Minn., is almost completed.

J. H. Orebaugh is putting in one of Simpson & Gault's Pony middlings mills.

Martin & Co. are adding two Snow Flake purifiers to their mill at LaFayette.

A Philadelphia firm is turning out two complete mills for shipment to Australia.

A. A. Freeman & Co., of La Crosse, Wis., will have their mill completed in a few weeks.

D. Wellsheimer is to rebuild his large flouring mill at Greenfield O., recently destroyed by fire.

Two hundred and fifty men, 200 of them carpenters, are at work on the new elevator at Duluth.

John McMillen will soon have a grist mill running at his ranche on the upper Gille, New Mexico.

J. T. Ames' Sons, Northfield, Minn., have rented the railroad company's large elevator at Northfield.

A steam grist mill is to be built at Herman, Lake county, Dakota, this summer. Hay will be used for fuel.

Guthrie & Long, Owensboro, Ky., have ordered one of Simpson & Gault's "Gladiator" Dustless Shellers.

A. A. Freeman & Co., of La Crosse, shipped several middlings purifiers to River Falls, Wis., on July 21.

The Pembina mill company are building a fine mill at Pembina, Dak. It is to be finished by Oct. 1st.

The new Washburn mill at Anoka, Minn., claims that it can beat the flour made in Minneapolis mills.

A flouring mill at St. Genevieve, Mo., was demolished by a boiler explosion, July 17th, and two men killed.

B. M. Carter, of Mauston, Wis., informs us of his intention to build a custom mill at that place in a few months.

H. B. Rulman, Laurel, Ind., is putting in one of Simpson & Gault's Dustless Champion Separators and Cleaners.

The Bear Creek flouring mill, near Eau Claire, Wis., which was damaged by the flood last month, is being repaired.

Adolph Egloff is putting one of Simpson & Gault's Snow Flake purifiers, new Cloths, etc., into his mill at St Meinrad, Ind.

W. S. Fant has ordered from Simpson & Gault, an Economic flour packer, corn meal bolt, etc., for his mill at Flemingsburg.

The flouring mill at Osseo, Wis., belonging to J. Linderman, was struck by lightning July 11 and totally consumed. Loss not stated.

The citizens of Lamberton, Minn., are endeavoring to induce Mr. Draper, of Bingham Lake, to remove his flour mill to Lamberton.

The Beaver's Creek flouring mill, near Carver, Minn., is making considerable shipments of flour, besides having a good run of custom work.

Simpson & Gault are furnishing Rulman & Summan, of Oldenburg, Ind., a Snow Flake purifier, and Champion Dustless separator and cleaner.

S. A. Brown, of Bowling Green, O., has ordered from Simpson & Gault, a new run of buhrs, new chest, middlings mill, clothing for reels, etc.

Simpson & Gault are furnishing Harness & Draper, for their mill at Hutsonville, Ill., a Champion dustless separator and cleaner and a bran mill.

Geo. L. Jackson & Co.'s flouring mill at Augusta, Ga., was recently somewhat damaged by fire communicated from a burning machine shop near by.

A fire broke out in the Chicago & Northwestern railway elevator, at Mankato, Minn., recently but was extinguished before any seri damage was done.

C. W. Weld's grist mill, at West Dudley, Mass., was burned on last Wednesday night by a fire of unknown origin. The loss has not been ascertained.

The busy condition of the Windom mill, at Windom, Minn., may be inferred from the fact that it has recently bought 2,000 wagon loads of wheat for immediate use.

Simpson & Gault are making some additions to the mill of H. A. Waters, at Edwardsport, Ind. They are putting in one of their Pony middling mills and other machinery.

Simpson & Gault are furnishing H. H. Brown & Co., Parsons, Kan., some of their improved machinery, including middlings mill, bran mill and bolting chest, also new clothing, etc.

The engine in C. A. Gannis' mill at Central Point, above Lake City, Minn., was demolished by the breaking of the drive wheel crank, a few days ago. Damage about $500.

The Stillwater mills, Stillwater, Minn., will shut down as soon as they have used up the wheat they have on hand, for the purpose of making repairs and increasing the capacity of the mill.

The Chicago, Milwaukee & St. Paul Co. have just completed a douple track from their depot at Northfield to the Ames flouring mills and the shipping of flour is now direct from the mills.

The Messrs Furth, of New Zealand, who also came for the single purpose of attending the Exhibition, were very much pleased, and say they will buy a large and complete outfit before returning home.

Excavating has been begun for the erection of a large elevator in Hastings, Minn., by the Chicago, Milwaukee and St. Paul Company. The capacity of the building will be upward of 100,000 bushels of grain.

Henry W. Clagett's steam saw and grist mill at White's Landing, Prince George's county, Md., was recently badly shattered by a boiler explosion. Ben. Truman, the colored fireman, was fatally scalded.

In Watonwan county, Minn., there is not a flouring mill, except a small custom grinder at Madelia. There is a fine business opening for some enterprising miller who will erect a four-run mill at the county seat village.

Jas. Sorenson has purchased a mill site and sixty five acres of land fifteen miles south of Valley City, Dakota. He will build a four-run mill, 30 by 40 feet, three and one-half stories high, above the basement, which will be ready to run next year.

Roeskie Bros., of Michigan City, Ind., are building a three-run new process mill, to be furnished with chilled iron rolls, and all the latest improvements. The power will be supplied by two 40 inch and one 35 inch wheel, furnished by E. B. Brooks, La Porte, Ind.

Messrs. Webster & Wescott have the contract to rebuild and enlarge the new roller mill at Mill Point, Ontario, which was started up about two months ago. The capacity when completed will be 300 barrels a day, and there will be but two run of stone in the mill.

J. T. Cook, head miller of the Sand Creek mills, Jordan, Minn., has just obtained letters patent upon an Automatic middlings purifier Several of these authomatic purifiers have been in use at the Sand Creek mill for some time, and one is being tested at the Shakopee flouring mills.

Messrs. Smith Bros., the Milwaukee millwrights, are overhauling the mill in Los Gatos, California, and are also putting a great quantity of new machinery in the malting department for the world renowned Jos. Schlitz Brewing Co. They are crowded with work day and night.

Simpson & Gault, owners of the Straub Mill Company, have sold, among others, one complete 8-run mill, furnishing everything throughout, of their own manufacture seven of the celebrated Snow Flake purifiers and several of their improved Champion smutters and a Champion brush machine.

Messrs. Levan & Sons' merchant mill is situated on Conestoga creek, one and one-half miles south of Lancaster, Pa. It is a seven run water mill, 40x155 feet, four stories high, with a capacity of 125 barrels per day. The mill was first built in 1870, but it has recently been enlarged and greatly improved.

An Appleton, Wis., correspondent writes us that the milling business is very good. Messrs. Kimberly, Clark & Co., who formerly reserved 3 run of stone for custom trade, have now torn them out and are replacing them with roller mills, and the mill will hereafter be exclusively a merchant mill, and it will be the largest mill in the northwestern portion of Wisconsin. From general observation and inquiry, our correspondent is inclined to believe that the wheat crop in Outagamie county will be very light, while that of other grain and potatoes will be good.

The well known firm of Howes, Babcock & Co., of Silver Creek, N. Y., manufacturers of wheat-cleaning machinery, has made a permanent arrangement with Cook & Thayer, River Falls Wis., for the manufacture and sale of their automatic magnetic separator, the only machine that removes metallic substances from grain automatically. This is a machine that should meet with a large and rapid sale, and in the hands of the above named firm, it will doubtless prove a complete success.

The United States are furnishing Mexico with vast quantities of material for railroad and telegraph building, and there are a great many American engineers and telegraph men employed. In former times England shipped the larger share of materials, but has now to be rated second on the list. The cordial feeling existing betwe en the United States and Mexico for some time past has done a good deal toward diverting trade to the United States.

Mr. Mason, of Natal Colony, South Africa, who came to Cincinnati soley to see the Miller's Exhibition, says he was amply repaid for his trip of 11,000 miles, here and back, by the display of milling machinery he saw. When he first noticed the advertisement in a milling journal from this country he had barely time to reach this city by constant travelling, not allowing for any detention, but nevertheless he started at once, arriving here in time to view the show during the last three days.

There is a considerable movement of grain to Europe just now, and at the Produce Exchange on Friday there were some further heavy engagements made for shipping, principally by sailing vessels. During the early hours on 'Change about 272,000 bushels of grain, mostly corn and wheat, were engaged on the berth for British market. It is said that the clique who have hitherto controlled so much wheat here, are unloading pretty freely, and this, together with the reports of wet weather abroad, has caused a larger export trade than usual in order to realize at present prices.

J. H. Redfield, Salem, Ind., manufacturer of Redfield's combined elevator and purifier, &c., reports business as being very good, especially since the exhibition. He has lately received letters speaking in high terms of his elevator and purifier from the following named parties who have just started the machine: W. T. Wigall, Quincy, Ind.; Louis Kamp, Mount Carmel, Ill,; J. Watts Fair Haven, O.; Guartney & Byrum, Mankport, Ind.; Holland & Carler, Comanche, Texas; Robert Craig, Silverville, Ind; R. M Dill, Morgantown, Ind.; Hoffman& Davenport, East Liberty, O.; J. D. Beacham, Taylorsville, Ken.; Viets & Cotes, Riverton, Neb.; Trobroke & Aldurhager, Waymansville, Ind; Kams, Peters & Co., Knoxville, Tenn. (2 machines); W. G. Anderson, Garyhampton, Ky.; C. Branaham, Mooney, Ind.; L. E. Nelson, Shelbyville, Ind.

Among the orders lately received by C. F. Miller, of Mansfield, Ohio, for flour mill machinery and materials, are the following:

Messrs. J. & E. Plank, of Independence, Ohio, a complete outfit for a new five-run mill to be ready for operation about Sept. 1st., 1880.

Messrs. Carter & Howe, Mt. Victory, Ohio, all the machinery and materials for a four-run, new process mill, to be completed about August 10th.

Messrs. Henry & George Grease, Mohicanville, Ohio, new and improved machines, bolting cloth, and other materials for their mill, which is to be fitted up for the improved system and to be in running order about 1st of October.

Messrs. Fish & Storer, Shelby, Ohio, bolting cloth, shafting, gearing, pullies, and other materials. This mill belongs to the larger class of mills' and though running to its full capacity, night and day, the proprietors find it impossible to fully supply the demand for this flour.

Messrs. Mander & Smith, Grafton, Ohio, a Munson middlings mill, Excelsior middlings purifier, wheat cleaning machines, bolting cloth, belting, wheat heaters and other materials. This mill has been running for some time, and is turning out first class work.

Messrs. Commins & Allen, Akron, Ohio, three runs 48-inch burrs, with irons complete, considered superior to any mill burrs, now in use in that city.

How to Back a Stone.

BY PALLET.

When the back of the running millstone is not sound, but breaks and flies off in the running; or where the stone is not so heavy as you wish it, considerable loss of time, trouble of sending to the builder, and expense are entailed. By following the instructions I give below, the same operation may be done at home, and the back made as good and sound as the builder could make it. It is as follows: You block the stone up with a block of wood, having its face down until it lies even, solid, and perfectly level; then pick and scrape off all the plaster down to the face blocks, so that none remains but what is in the joints of the face blocks; then wash these blocks, and keep soaking them with water. There should also be a number of pieces of burr blocks, at the same time, washed clean and kept soaking. You then with a bucket half filled with clean water, and mixed with two tablespoonfuls of glue-water boiled and dissolved, but not made so strong as joiners use it, mix in with it with your hand plaster of Paris until it be thick enough that it will not run, and, breaking all the lumps, pour this on the stone, rubbing it with your hand—the stone being at the time damped; and place small pieces of stone all over the joints of the face blocks. You then, with more plaster, mixed in the same way, but made more stiff, with this and pieces of burr stones, build walls around the edge and verge four or five inches high, leaving the surface uneven and the eye larger, as it will be brought to its proper size by the last operation. It is better to build up the wall of the running stone round the verge for three inches without any spalls, so that the holes may be cut in to balance it. If you then wish to make your stone heaver, you take pieces of iron (broken into small pieces, well washed and perfectly clean; for if there be any grease on this iron, the plaster will not adhere to it) and lay them evenly all round the stone, in the place between the two walls just built; and with plaster mixed a little thicker than milk, pour in under and through all the crevices in the iron until the surface is nearly level with the two walls. If the stones do not require additional weight added, instead of iron use pieces of stone, and round the eye of the stone, until they are within two inches of the thickness you want your stone to be, the wall round the eye being two inches higher than that round the verge, and filling the space between these walls with stones, and pouring in plaster again, make it nearly level with the walls, but leaving the surface rough and jagged, to make the next plaster adhere well to it. You now let it stand until the back is dry and perfectly set, when you raise the stone upon its edge, and, with a trowel, plaster round the edge of the stone neatly, giving it a taper of half an inch from the face to the back of the stone. When cased round in this way, lay the stone down on the cock-head, it being in the balance ryne, but the driver off; then raise the spindle, and balance the stone as already directed before putting on the remainder of the back. You then have a tin made the size of the eye, and to reach from the balance ryne to the thickness you want the stone to be at the eye. This tin should be exactly fitted to its place, and made fast; then fit a hoop of wood or iron round the verge, having the upper edge the thickness from the face you want the stone to be at the verge, and equal all round. This hoop should be greased, and all the cracks round it, and the tin in the eye being stopped, you pour thin plaster (having more glue water than in operations before performed, to prevent it from setting so quickly, and to give time to finish the back correctly) until it be level with the hoop round the verge, and with a straight edge, one end resting on the hoop, and the other end resting on the tin at the eye; then, by moving it round, and working the plaster with a trowel, make the surface of the back even and smooth between these two points. The hoop is then taken off, and the back and the edges planned smooth. Then lower the spindle until your runner lies solid, and put your band or hoop on, it being first made nearly red hot, and taking care that it is of sufficient size not to require too much driving; if fitting too tightly it may loosen the back in driving it to its proper place. It may be cooled gently by pouring water on it, and when cool it should fit tight. It is necessary that there be plenty of help in this operation, as it requires being done quickly; and care must be taken to have the best plaster of Paris, for if the plaster is not good, the back cannot be made sufficiently sound.—*Northwestern Miller.*

Material and Form of Dams.

With this issue we begin a series of illustrated articales on the construction of mill dams, knowing full well the importance they bear to our lumber industry. To make the subject as practical to the reader as possible, we have condensed a few ideas on the material and form of dams from the work in question. As Messrs. Leffel & Co. truly say, the household proverb that "fire is a good servant, but a bad master," is true in an almost equal degree of water, its opposing element, and it is, therefore, very important that it be kept under perfect control.

As the first step of the improvement of a water power is the foundation of the weirs, so the prime consideration should be strength and durability. How this may be done under manifold conditions is pointedly set forth in in the excellent work before us. The dams thrown across the beds of streams have been built in many shapes and of different materials, some of them too costly for general use in a country where small mills are chiefly needed. In cases where the supply of water is large and a high fall is not demanded, a temporary one, composed of boulders is sometimes thrown diagonally across the stream, thus partially forcing the water into the race above the dam. Being hasty and cheap it may be easily repaired and is found to answer in many cases where a heavy head is not necessary, but the incovenience of filling in after every heavy rise is its principal drawback. In contrast with this crude species are those of more solid and artistic nature, securely built of stone, and stretched across the stream in the form of a bow—the middle of the dam, in other words, being higher up the stream than the ends. A form of weir has likewise been made resembling the letter V, with the apex up stream. If built upon piles with a frame of timber forming an inclined plane upon the face of the dam, and filled up with gravel surmounted by a mass of boulders well packed in, the structure will be nearly impenetrable by water, as will be seen by those who understand the laws of resistance. Undue accumulations of water are often regulated by sluicegates, self-adjusting dams, or with movable flash boards held in their places by pins.

In some localities where stone is not readily obtained, as in many portions of the West, frame dams are the cheapest substitute, and if properly made, answer all ordinary purposes. Where there is a firm, level bottom, the frames, which are made in a triangular shape, may be placed directly on the bed of the river, without any intervening foundation. On a soft or uneven bottom, requiring a heavier foundation, three tiers of timbers running parallel to each other across the stream are placed at the foundation of the dam, one tier at the lower and one at the upper side, and the third midway between them. Posts are then framed into the lower and middle tiers of timbers, upon which are framed two upper tiers of timbers to firmly secure the rafters, before planking is fastened, a strong and serviceable dam is the result, with but a moderate outlay of time or money. But Leffel assures us that the best form of weir, whatever the material, is that resembling a bow, with the arch up stream, though owing to the extra expense of time, labor, and material, the straight line structure is most frequent in frame or log plans.

Another form of cheap dam may also be insured where timber is abundant, by laying a foundation of logs of considerable size, lengthwise of the stream and close together, forming a sort of corduroy from bank to bank. If the bottom is soft, care should be taken in making the first layer closely conform to the irregularities of the bed, and the deeper placed the less liable they will be to decay. The breast of the work is built near the up stream side of this foundation, the logs extending from under it down stream, and serving as an apron to receive the waste water as it comes over. The rafters and the coverings of the dam form an inclined plane on the up stream side, and extends over the upper ends of the logs, protecting the foundation from being undermined. Dams of this kind have been made with good effect in many timbered sections and different modifications of it will readily suggest themselves to the practical mechanic. It would doubtless be interesting to follow more closely into the detail of the merchanism, but the space will not permit at this writing.